CHAPTER 9: CONCLUSIONS AND FUTURE DIRECTIONS

9.1. CONCLUSION

Delivering time sensitive applications such as streaming video and audio over WLAN requires differentiated and prioritized channel access mechanisms. The WLANs exhibit undesirable characteristics like time-varying bandwidth, higher delay, jitter and packet losses. To enhance the performance of WLAN for these applications, some important issues need to be effectively dealt with, so as to guarantee the required characteristics. Compared to wired networks, the wireless networks make real-time applications even more challenging. A detailed study of past theoretical and practical work has been carried out. Based on these backgrounds this research work has been taken-up.

One of the foremost contributions of this thesis is to ensure End-to-End QoS adopting suitable architecture. This QoS architecture is proposed to overcome the limitations of the existing QoS architectures viz, lack of cross layer interactions, end-to-end integration, re-configurability, and modularity [59]. The proposed architecture comprises of the main components such as, network monitor, packet scheduler, packet classifier, traffic analyzer and admission controller. All these components must work together, rather than in isolation, to deliver the required QoS. Moreover the proposed architecture is highly reconfigurable. The effectiveness of the architecture is assessed by simulation considering all the components in unison to deliver better QoS in a wireless network.

The adaptive dynamic admission control mechanism by optimizing the reward values, proposed in this thesis is to enhance the QoS of IEEE 802.11e WLAN for high
priority load. It is designed to perform the priority reservation policy also. This mechanism performs better than the one that does not take into such considerations. The reward and penalty characteristics determine the best reservation mechanism to be accepted over the others, so as to maximize the total pay-off than other mechanisms.

IEEE 802.11e with EDCA is unable to deliver the required QoS for streaming applications. The adaptive dynamic admission control mechanism [3] proposed here is to improve the QoS service of IEEE 802.11e based wireless local area network. It evaluates the traffic and allows access to the QAP, based on the maximum and minimum QoS requirements and average delay for the contending real-time applications with different parameters. The admission control mechanism proposed in this thesis provides flexibility for both admission and reservation management. This could provide better performance by admitting more real-time traffic and maintaining the QoS at the acceptable level.

Providing QoS guarantee for real-time applications over MIMO wireless channel is challenging. The priority based admission control mechanism adaptive modulation and coding scheme proposes a QoS provisioning for wireless stations with multiple antennae. It provides QoS guarantee in a MIMO based IEEE 802.11n WLAN. Using proper scheduler and admission control algorithm, the system guarantees a certain fixed data rate and minimum delay for different classes of traffic. The proposed algorithm provides QoS guarantee and efficient utilization of radio resources.

The unevenly distributed load among access points in a WLAN is another important challenge for its performance. Along with other QoS issues in a WLAN, this problem may also cause the wireless local area network temporarily unusable due to the failure of the AP. The dynamic load balancing technique implemented in this thesis
addresses this issue using the RSSI value in the network. This scheme enables distribution of the wireless stations into the other access points to derive the maximal total network throughput and minimize the number of re-transmissions.

9.2. FUTURE DIRECTIONS

There are number of places with prospective for future enhancement in IEEE 802.11 WLAN. As this protocol is widely used and has several important characteristics, there are several enhancements possible.

- To extend the end-to-end QoS architecture to OFDMA more for supporting the wireless local area network with IEEE 802.11n standard to ensure higher data rate.
- To develop an admission control model and make it more intelligent by combining different admission control mechanisms.
- To improve admission control process in MIMO.
- To improve load balancing using Fuzzy logic.