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25. Protocol Design Issues in WLAN

Abstract

Providing guarantee of quality of service (QoS) is a key problem of today's wireless networks. Many frameworks (IntServ, DiffServ, MPLS, Traffic engineering, etc.) have been proposed to provide service differentiation in the Internet. Many previous research works show that what works well in a wired network cannot be directly applied in the wireless environment. IEEE 802.11 wireless LAN (WLAN) is the most widely used WLAN standard today, but it cannot provide QoS support for the increasing number of multimedia applications. Thus, a large number of 802.11 QoS enhancement schemes have been proposed, each one focusing on a particular mode. This report summarizes all these schemes and presents current research activities. Despite its crucial role in affecting end-to-end performance, past research has focused on MAC protocol enhancement, analysis and simulation-based on performance evaluation without sufficient consideration for modeling inaccuracies stemming that significantly has an impact on performance.

First, we analyze the QoS limitations of IEEE 802.11 wireless MAC layers. Then, different QoS enhancement techniques proposed for 802.11 WLAN are described and classified along with their advantages/drawbacks. Finally, the upcoming IEEE 802.11e QoS enhancement standard is introduced and studied in detail.

We will also work on the priority schemes of the EDCA mechanism of the IEEE 802.11e standard. EDCA provides a class-based differentiated Quality of Service (QoS) to IEEE 802.11e WLANs.

The main contribution of this work as opposed to other works is that the predictions about the throughput, delay and frame dropping probabilities of the different traffic classes in the whole range from a lightly loaded, non-saturated channel to a heavily congested, saturated medium. We will also describe the differentiation based on different AIFS-values, in addition to the other

adjustable parameters (i.e. window sizes, AIFS, PF etc.). This work will calculate numerically and validated against simulation results.

We will also, observe a good match between the analytical model and simulations. We are proposing in this work to adapt the concept of Quality of Service (QoS) issues in wireless LAN scenario. A deep comparative analysis has been proposed with leader based schemes and results has been verified using OPNET simulator.