Chapter 27  
Comprehensive Structure of Novel Voice Priority Queue Scheduling System Model for VoIP over WLANs  

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ABSTRACT  
Voice over Internet Protocol (VoIP) has grown quickly in the world of telecommunication. Wireless Local Area Networks (WLANs) are the most performance assuring technology for wireless networks, and WLANs have facilitated high-rate voice services at low cost and good flexibility. In a voice conversation, each client works as a sender or a receiver depending on the direction of traffic flow over the network. A VoIP application requires high throughput, low packet loss, and a high fairness index over the network. The packets of VoIP streaming may experience drops because of the competition among the different kinds of traffic flow over the network. A VoIP application is also sensitive to delay and requires the voice packets to arrive on time from the sender to the receiver side without any delay over WLAN. The scheduling system model for VoIP traffic is an unresolved problem. The objectives of this paper are to identify scheduler issues. This comprehensive structure of Novel Voice Priority Queue (VPQ) scheduling system model for VoIP over WLAN discusses the essential background of the VPQ schedulers and algorithms. This paper also identifies the importance of the scheduling techniques over WLANs.

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1. INTRODUCTION

The scheduling system model plays a major role in the Voice over IP (VoIP) over Wireless LANs (WLANs). It fulfills the Quality of Service (QoS) requirements of the VoIP over WLAN through the scheduler, efficient algorithms and managing traffic flow. The VoIP over WLAN is another emerging application besides the Internet Protocol TV (IPTV) and the High Performance-Video Conferencing (HP-VC). This paper presents a new VoIP scheduling system model and algorithm in order to enhance performance of voice traffic over WLANs. The scheduling system model is an important technique to achieve efficient throughput and fairness over WLANs based on IEEE 802.11 standards (Lee, Claypool, & Kinicki, 2010; Wang & Zhuang, 2008). Scheduling techniques manage voice traffic over WLANs. It will be able to offer bandwidth link-sharing to tolerate the status of changing traffic queues and to be scalable over IP-based networks. A number of related schedulers have been proposed to support traffic flow over IP-based networks. Most of the existing schedulers support limited services and do not meet the requirements of real-time applications especially for the VoIP over WLANs.

The bottleneck of the scheduling mechanism is the downlink path and uplink path of traffic flow over WLANs. In the scheduling mechanism, the downlink path is comparatively easy due to the Access Point (AP) having complete information regarding traffic flow. As far as the uplink path is concerned, traffic flow comes from Stations (STA) which makes it difficult due to diverse techniques, procedures, parameters and traffic flow over networks (Ansel, Ni, & Turletti, 2006).

The IEEE 802.11 WLAN network is a wireless Ethernet, play an important function in the future-generation networks. WLAN is based on Link Layer (LL). LL is divided into Logical Link Control (LLC) and Medium Access Control (MAC) sub-layer categorizes with two functions, Distributed Coordination Function (DCF) and Point Coordination Function (PCF) (Mirkovic, Orfanos, Reumerman, & Denteneer, 2006; Wang & Wei, 2009). The IEEE 802.11 WLAN networks support both contention-based DCF and contention-free PCF functions. DCF uses Carrier Sensing Multiple Access/Collision Avoidance (CSMA/CA) as the access method (Cao, Li, & Leith, 2009; Dini, Font-Bach, & Mangues-Bafalluy, 2008; Li, Ni, Turletti, & Xiao, 2006; Ni, Li, Turletti, & Xiao, 2005; Garg & Kappes, 2003; Hole & Tobagi, 2004; Cai, Shen, Mark, Cai, & Xiao, 2006; Deng & Yen, 2005; Ergen, Lee, Sengupta, & Varaiya, 2004; Deng, Ke, Chan, & Huang, 2008; Wang, Liew, & Li, 2005; Tickoo & Sikdar, 2004). IEEE 802.11 standards 802.11a support 5GHz frequency band and 54Mbps data rate, 802.11b support 2.4GHz frequency and 11Mbps data rate, 802.11g support 2.4GHz frequency band and data rate 54Mbps (Ahmed, Jiang, Ho, & Horiguchi, 2009; Forouzan, 2007; Ni, Romdhani, & Turletti, 2004; Wu, Peng, Long, Cheng, & Ma, 2002; Li, Ni, Turletti, & Xiao, 2006; Ni, Romdhani, Turletti, & Aad, 2002; Xiao & Rosdahl, 2002; Garg & Kappes, 2004; Chen, Pang, Sheu, & Tseng, 2005).

2. PROPOSED VOIP SCHEDULER

A number of traffic scheduling system models has been introduced to enhance traffic flow over WLANs. Since in the WLAN, the VoIP Flow (VF) and Non-VoIP Flow (NVF) traffic flows are sharing the same transmission media, therefore, there must be a traffic scheduling system model to differentiate between the flows so that they can be successfully transmitted to the proper destination. In order to achieve QoS capability, the standard describes a number of parameters like traffic flow techniques, bandwidth request technique and channelizing for traffic flow. As studied, these standards have limited QoS skills over WLANs. As have come to realize, utilizing