Fourth Stage of Voice Priority Queue for VoIP over WLANs

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ABSTRACT

Voice over Internet Protocol (VoIP) is growing rapidly during this decade. VoIP is seen as a short-term and long-term transmission for voice and audio traffic and is moving on Wireless Local Area Networks (WLANs) based on IEEE 802.11 standards. Currently, packet scheduling algorithms like Weighted Fair Queueing (WFQ), was mainly designed to provide the bandwidth reservation. The Strict Priority (SP) is low-cost to maintain the delay sensitive voice traffic. Also, a number of research scheduling solutions have been proposed like General processor sharing (GPS), Deficit Round Robin (DRR), Contention-Aware Temporally fair Scheduling (CATS). Unfortunately, the current scheduling won’t be able to handle the VoIP packets properly and they have drawbacks over real-time applications. The objective of this research is to propose a Fourth Stage of Voice Priority Queue (VPQ) packet scheduling and algorithm to ensure more throughput, fairness and efficient packet scheduling for VoIP performance of queues and traffics. A new scheduler flexible which is capable of satisfying the VoIP traffic flows. Experimental topologies on NS-2 network simulator were analyzed for voice traffic.

Keywords: Network Simulation-2 (NS-2), Scheduler, Voice over Internet Protocol (VoIP), Voice Priority Queue (VPQ), Wireless Local Area Networks (WLANs)

INTRODUCTION

This research Voice over IP over Wireless Local Area Networks (VoIPWLAN) is in the developing field of wireless broadband Internet technologies which has the great potential to provide a low-cost high-speed Internet voice calls with user mobility that can profoundly impact our lives in a positive way. For example, nurses and doctors within a hospital can maintain voice communications at any time at lower cost than the cellular phone services (Cai, Xia, Shen, & Mark, 2006). Therefore, VoIPWLAN is becoming an attractive solution to campus and corporate network users for cheaper local and international voice calls, free calls to other VoIPWLAN units and a simplified integrated billing of both phone and Internet service providers (Mockapetris, 206; V. Soares, Neves, & Rodrigues, 2008).

Unfortunately, VoIP applications are sensitive to end-to-end packet delay and jitter. VoIP packets need to arrive on time at the destinations to meet the quality of service (QoS) requirements (Nisar et al., 2010; Qaimkhani & Hossain, 2009). The voice packets may drop at the access points (APs) due to high channel contention caused by various traffic (e.g., voice and non-voice) to be carried over the WLAN. Therefore, QoS is considered as one of the main issues of VoIPWLAN (Beuran, 2006). In WLAN, both voice flow (VF) and non-voice flow (NVF) traffic share a common unguided transmission media; therefore it is a challenging

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task to provide a better QoS to VFs in these networks. Traditional voice packet schedulers are mainly designed for wired networks which are not suitable for VoIPWLAN because they do not make any decision on classifying traffic flows at the APs. A good traffic scheduler for VoIPWLAN is required for an efficient deployment of such networks (more details below Design of the Study). Ideally, the traffic scheduler should provide a higher priority to VFs to minimize end-to-end delay and jitter.

Research on VoIPWLAN has recently attracted significant interest in the wider networking research community (Yeonsik, Kakumanu, Cheng-Lin, & Sivakumar, 2007; Lucani, Badra, & Bianchi, 2007; Kholaif & Todd, 2007; An & Soung Chang, 2007; Robert, Darko, Simon, Darko, Igor, & Nada, 2008). This research is concerned with the use of existing IEEE 802.11-based Wi-Fi networks for the purpose of vocal conversation both at home and work worldwide. VoIPWLAN can be conducted over any Internet accessible device, including a wireless laptop, personal digital assistant (PDA) or the new VoIPWLAN units similar to digital enhanced cordless telecommunications (DECT) and cellphones. Specifically to be addressed is the QoS of voice calls over a typical 802.11-based WLAN. This research aims to design, evaluate and implement a novel second stage Voice Priority Queue (VPQ) scheduler algorithm for improving the quality of voice conversation over a typical IEEE 802.11 WLAN.

By careful design of a second stage of VPQ scheduler for VoIPWLAN, VFs can be transmitted quickly with a higher priority to improve the quality of voice conversation. The idea is to classify incoming traffic flows as VF (high priority) and NVF (low priority) at the APs and serve them accordingly to meet the end-to-end delay and jitter requirements.

**PROBLEM STATEMENT**

IP-based networks are managing voice, data, web browsing, email, and video applications on the same network flow over WLAN networks. They were not mainly designed for real-time transmission over WLAN networks and it can be a deadlock in the traffic flow over WLAN networks. We show a bottleneck topology of mixed mode traffic over WLAN network as in Figure 1.

Quality of Services (QoS) is considered the main issue in VoIP system. Due to its importance, this research focuses on solving the VoIP scheduling algorithm problem. This research tries to compare with some well know real-time scheduling algorithms over WLAN networks. The proposed method tries to achieve better acceptable results for VoIP high-speed real-time application. In Figure 1, we implement a topology, it has bottleneck problem due to attacker on node 2 and node 5. VoIP is a real-time application that needs timely techniques to enhanced traffic over networks. This is a challenging task on VoIP networks.

Through the past decades many schedulers were introduced to solve real-time traffic application issues. These schedulers can be divided into three groups and these groups are as following, packet-based schedulers, frame based-packet schedulers, and regulative packet schedulers. These above problems degrade the QoS of VoIPWLAN. We need to introduce a new voice scheduling algorithm to solve above VoIP traffic issues. New method should be an efficient, fair, high throughput, bandwidth guarantee and that will enhance performance of VoIPWLAN.

**AIM AND OBJECTIVES**

The aim of this paper is to introduce an efficient schedulers and algorithms that support the VoIPWLAN. We will assume a fundamental related work to examine the available schedulers with their outcomes and their drawbacks. We will introduce new scheduler and algorithms to enhance the performance of VoIPWLAN using IEEE 802.11 standards. We will evaluate, examine, and simulate our techniques with related algorithms for real-time applications. To improve the real-time traffic scheduler al-
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