Research Issues in Wireless

Communications and Networking

Farhat Anwar
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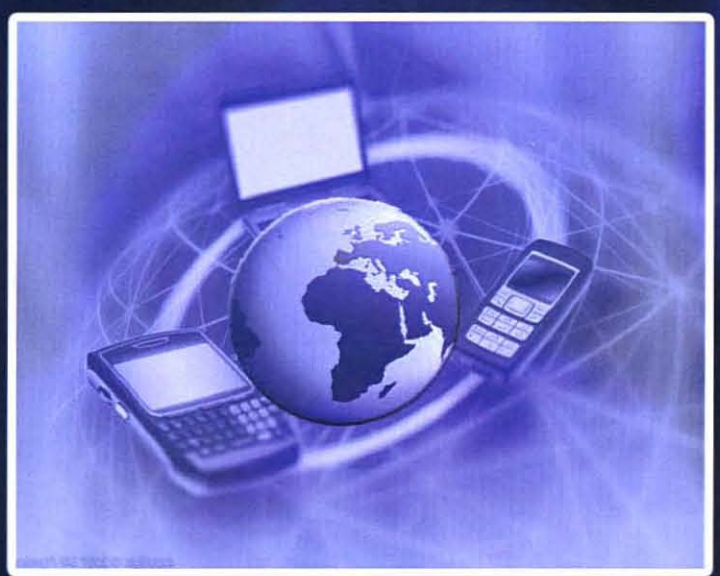

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CHAPTER 30
VIDEO STREAMING EVALUATION OF H.264 SVC ON IEEE 802.11G WIRELESS NETWORK

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30.1 INTRODUCTION

Scalable video coding (SVC) is gaining great interest because of its ability and scalability to adapt in various conditions of network. The term of scalability is referring to the removal of parts of the video bitstream in order to adapt it to the various needs or preferences of end users as well as to varying terminal capabilities or network conditions. SVC allows partial transmission and decoding of a bitstream [1]. It contains the base layer and the enhancement layers. The base layer should be transmitted with very high reliability. On the other hand, the enhancement layers might be dropped or only transmitted partially according to the available network bitrates [2, 3]. This allows very fast and accurate network adaptation to variable bit rate channels.

On the network evaluation, SVC enables us to send different packet types depending on the network conditions, i.e. higher bitrates for higher network capacity and vice versa. In this research, the 802.11g standard will be utilized for SVC evaluation. This is because the usage of 802.11g is commonly used and implemented, i.e. public, home, office, university networks. Therefore, the objective of this research is to evaluate the SVC performance over wireless network, WiFi.

In order to ease the monitoring process, the simulation tools can be of great help for a better understanding of the network analysis [4]. There are some network simulator tools which can provide some benefits in monitoring and evaluating the network analysis. These simulators are provided in the internet, either free or not free. Some of the free and open source simulators are Network Simulator 2 (NS2) and Scalable Video Evaluation Frame Work (SVEF).

NS2 supports two types of monitoring, traces and monitor [5]. A trace is used to record each individual packet as it arrives, departs, or is dropped at a link or queue. Tracing in NS2 could be trace packets on all links, certain link, or just for specific event. Currently, NS2 is not compatible with the SVC packet. Therefore, it becomes a problem to simulate SVC streaming using NS2. So far, only H.264/AVC or single layer video coding can be supported by NS2 as implemented in [6].

Another free and open source simulation available tool in scalable video streaming standard is newly introduced as Scalable Video Evaluation Framework (SVEF) (Detti et al., 2010). The SVEF is a mixed of online and offline open source framework devised to evaluate the performance of scalable video streaming. Since SVEF supports scalable video coding, SVEF will be considered as the preferred option for streaming simulation tool for this research as it supports Network Abstraction Layer Unit (NALU) and two types of network analysis, online and offline.

In the evaluation of scalable video streaming, the SVEF supports the encoding data from Joint Scalable Video Model (JSVM) reference software. The supports provided by SVEF covers SVC video streaming over Internet Protocol (IP), through encapsulation of NALUs in a simplified Real Time Protocol (RTP) structure, and support receiver side decoding and reproduction of an SVC stream affected by arbitrary NALU losses and payout delay constraints [8].

30.2 VIDEO STREAMING OF H.264 SCALABLE VIDEO CODING

SVC was standardized as an extension of H.264/AVC. It reuses some functions that have already been provided at H.264/AVC. Conceptually, the design of SVC covers a *Video Coding Layer* (VCL) and a *Network Abstraction Layer* (NAL), same as H.264/AVC was designed, as described in Figure 30.1. VCL represents the code of the source content (input video), the NAL forms the VCL data in simple form and effective so that the VCL data can be utilized by many systems.