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Investigation of User Datagram Protocol (UDP) Performance in IEEE802.11b WLAN

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ABSTRACT

UDP is a connectionless transport protocol which is mostly deployed for real time applications. This paper proposes the research concept of investigating the performance of UDP in IEEE802.11b WLANs using packet loss and packet delay as a metric under video streaming application. The methodology involves extensive literature review of related work, setup of the experimental WLAN, obtaining live video feed. It is expected that at the end of the research a performance model for UDP in IEEE802.11b will be developed.

Key words: UDP, IEEE802.11b, Packet Loss, Packet Delay.

Aims Research Journal Reference Format:
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1. BACKGROUND TO THE STUDY

Today the intention of industry and service provider is turning to deploying WLAN in public places from which people can benefit from a seamless public access to the internet (Haito, and Jill, 2001). However, there are several business and technological challenges that need to be solved to make this public WLAN a complete global network infrastructure, especially as the number of users increases and newer emerging applications are discovered. The ability of assuring a maximum level of quality of service (QoS) to the users, in terms of guaranteed throughput and end-to-end delay bound is one of the most important concerns for the service providers (Raffaele, and Enrico, 2008). In the internet communication, protocols are set of rules that governs how packet is being sent over the internet. Its usefulness lies on the Open System Interconnection (OSI) model which is a layered model comprising of seven layers, each representing a particular network function. At the transport layer of the Open System Interconnection model, lies the Transmission Control Protocol (TCP) along side with the User Datagram Protocol (UDP).

User Datagram Protocol is a client/server network application based on the Internet Protocol (IP). It is the main alternative to Transmission control protocol (TCP) (Margaret 2016). In terms of initial connection TCP has a reliable data connection while UDP has unreliable data connection. In reliable data connection, packet sent from one point is received at the other end in correct order, while in unreliable data connection, packets are either lost, duplicated or even received out of order. The User Datagram Protocol is faster and more efficient than Transmission Control Protocol for applications that do not need a guaranteed delivery of data. (Patil, 2012). The deployment of UDP in real time applications such as audio and video streaming, tele-conferencing, voice over internet protocol (VoIP), online gaming, community storage solutions, some e-commerce transaction (such as secure electronic transaction), chatting and instant messaging (IM) as well as the network performance under these scenarios are issues for consideration in this on-going research. (mohammed.T,2014). However, in this paper, the area of video streaming application is presented. Video streaming as an application is very challenging and demanding in wireless networks.

As a result, efforts have been made over the years to improve the performance of UDP in IEEE802.11 WLANs (Patrick and Soung 2004). There are various metrics used to assess UDP performance in a WLAN setting. Some of these metrics are; congestion, packet loss, packet delay, jitter, latency, throughput, bandwidth, etc.(Microsoft,1999) The performance of UDP can be interpreted based on any or a combination of these metrics. In this research, packet loss and packet delay will be used as indices to measure the performance of IEEE802.11b WLAN under video streaming scenario.

1.1 Statement of Problem

It is important to understand the behaviour of video traffic over UDP in order to find how best to improve it. Since UDP is an unreliable protocol that uses best effort to send data. Packet loss and delay are errors introduced during transmission which slow down performance and decrease user experience. Hence there is always an ongoing need for reduction of these errors so as to make the network operate more optimally. In studying these factors, various network analyzers are used to analyze network traffic. Network analyzer commonly used include Iperf, Jperf, Network Simulator GNS and so on. Due to its relevance in modern day applications such as business transactions, tele conferencing real time video and audio streaming among others, it is important to investigate more on UDP performance issues so that it can be optimally deployed over wireless networks.

1.2 Research Objectives

The main goal of this work is to investigate the performance of UDP in an IEEE 802.11b WLAN. To realize this, the following objectives are set out:

i. To assess UDP traffic over the experimental wireless network infrastructure.
ii. To measure the packet loss and delay of UDP video traffic.
iii. To evaluate the performance of the UDP protocol over the WLAN.

2. METHODOLOGY

2.1 The Research Design

The research design will be in stages as shown in figure 1.

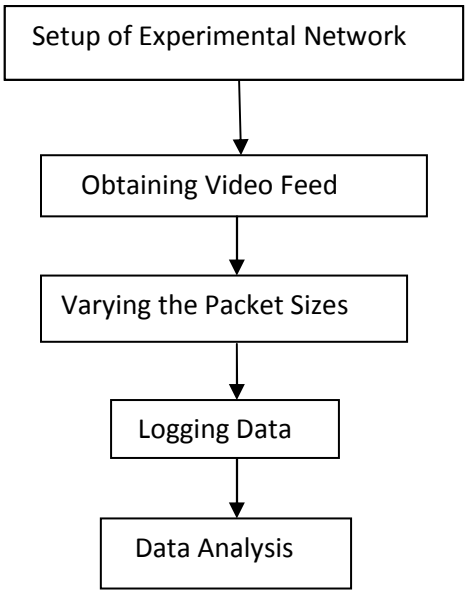

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Figure 1: Research Design.

2.1.1 Experimental WLAN Set-up

The WLAN infrastructure will consist of a server (located at the University of Benin Central Record Processing Unit (CRPU)), a hub connected to a wireless access point, network analyser and a client laptops connected to receive the video data. In setting up an experimental network, we have to know our experimental layout, either we are using a Basic service Set (BSS) which is one access point connected to other devices or an Extended Service Set (ESS) which is more than one access point connected to other devices.

2.1.2 Obtaining Live Video Feed

The CRPU of University Of Benin is the main distribution data centre of the university. The video feed is going to be generated from a server in that location.

2.1.3 Varying The Video Packet Sizes.

The sizes of the video files will be varied in order to investigate properly the key parameters of interest namely packet loss and packet delay in the UDP traffic.

2.1.4 Logging the Various Data Sessions.

The various data sessions will be logged for analysis .

3. DATA ANALYSIS & PRESENTATION OF RESULTS

The measurement test bed comprises of two scenarios; Traffic flow 1 and Traffic flow 2 as shown in Fig. 2. In traffic flow 1, the server from the CRPU has a Video LAN Client(VLC) player where the real video feed is been played this feed then comes through the hub to the wireless access point. The network analyser **Nstart** then analyses the entire network to check for any other unexpected activities that is not part of the video data, so that measurement can only be due to traffic flow. When the traffic gets to client 1, there is a software called **Tcpdump** which helps to record the logged details of sent and received packet for further analysis. In traffic flow 2, **Iperf** generates the required UDP traffic, then the network analyser does the same job as in traffic flow 1 which is; checking for any unexpected traffic, the generated video traffic then enters client 2 where **Tcpdump** then logs and enters the data that was sent and received. The results presentation parameters are as shown in Table 1.

Table 1. Results of Data Analysis.

Size of Datagram (..unit)	Packet Loss (...unit)	Packet delay (...unit)	Bandwidth (...unit)

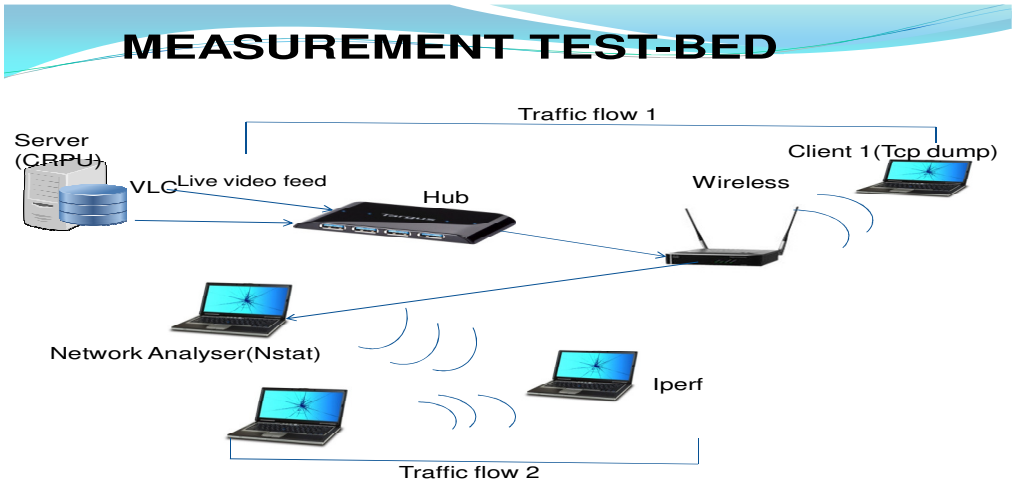

Figure 2. Measurement Test bed

4. DISCUSSION OF FINDINGS

Based on the values that will be given by the IPERF software a better understanding of UDP performance over WLAN in terms of video traffic will be provided. The findings will provide information on the behaviour of the network and how best traffic over the network can be improved since UDP is an important protocol in network applications.

5. CONCLUDING REMARKS

This paper presents the investigation of UDP performance over wireless local area network. The methodology has been described and literature review have been carried out. A future work will involve taking actual measurement to analyse UDP performance. This is important to investigate more on UDP performance so that it can be optimally deployed over wireless networks.

6. CONTRIBUTIONS TO KNOWLEDGE

It is expected that at the end of this research work a proper understanding of UDP packet loss and packet delay issues in IEEE802.11b WLAN system will be made.

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