VIDEO STREAMING PERFORMANCE MEASURE OVER DIGITAL POWER LINE

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ABSTRACT

Power-line networking is one of the several ways to connect the computers in your home. In-House power-line can be defined as a building equipped with numerous sensors, where (example: heating, air-conditioning, illumination) can be automatically and remotely controlled and supervised. These applications occur within a single building with both ends of the communications link within the same building. The building might be a house, an apartment block or an office building. The path over which the transfer of data occurs within these buildings is relatively short - typically it is less than 100 m between devices. This has been possible due to the relatively low power levels necessary to communicate over the comparatively short (cabling) distances within a building.

When the HomePlug AV specification is ratified, HomePlug will deliver a 200-megabits-per-second data rate, with expected throughput just shy of 100 mbps, which makes it ideal to transmit multiple streams of video throughout the home.

The purposes for this project is to introduce and implement digital power line communication network as an alternative way in LAN communication, to allows data travel through electrical wires rather than telephone wires network, to analyze video streaming in Direct LAN and to measure the performance of video streaming over digital power line based on second objective.

This project will cover the transmitting data via the network to other terminal device plugged into or attached to the network. The terminal devices connect to the host, and then data will transfer across the power-line electrical supply to the internet. The output will come out with the mechanisms which control the terminal electrical device using digital power-line communications.

PROJECT BACKGROUND

The conditions of DPL which is enabled data travel through electrical wires rather than telephone wires network which carry digital signal to terminal device using Digital Power line. The transmission medium over networks has leads to the ineffectiveness of the video streaming performance.

To overcome this situation an analysis to video streaming performance is measured to identify the source of the problems. The analysis will be

measured based on the quality of transferring video over power line which are streaming, response time, real incoming and outgoing traffic, and throughput. Those parameters are will then be analyzed using software analyzer that will be discussed later in next chapter.

PROBLEM DESCRIPTION

There are many factors that will cause to the channel or network error which can result in damage to or loss of compressed video information during transmission or storage. Because of very high compression has typically been applied to the compressed bit stream, any such damage will likely lead to objectionable visual distortion. Some of the factors are packet damage or loss of compressed video, video quality, transport protocol, bandwidth, timestamp and throughput.

Although end users want the option of having high-quality of video over internet but there still have problem. Delay and packet loss which are very sensitive to video are the key contributors to poor quality of video transmission. Users do not know what the causes are and why they are facing the problems although they buy a good and quality of device.

Therefore this project is conducted with the name of purpose is to measure performance of video streaming over digital power line technology. Analysis is measured and once the caused is identified a specific task can be taken to overcome the situation.

PROJECT OBJECTIVE

This project is done regarding to the main objective. It is important to state the objectives of the project clearly; it is to ensure the project is kept on track. The objectives of this project are:

i. to introduce and implement digital power line communication network as an alternative way in LAN communication.
ii. to analyze video streaming in Direct LAN using power line.
iii. to measure the performance of video streaming over digital power line based on second objective.

PROJECT SCOPE

This project will focus on performance of video streaming over digital power line using direct LAN. As the main objective of this project is to allow data travel through electrical wires rather than telephone wires network which carry digital signal to terminal device using Digital Power line.

PROJECT SIGNIFICANT

It is hope that when this project paper is completed, it will be valuable additional information to Video Streaming over Digital Power Line users to understand why they are obtaining inadequate video quality. Therefore, it is hope to reveal why Video Streaming over Digital Power Line performance degradation occurs and also help user that wants to troubleshoot their own conversations overcome the causes through this information.

As the conclusion, this project paper can give benefit to people by providing information's about the Video Streaming over Digital Power Line performance in depth. Besides that, it easier for users to understand each type of the Quality of Services (QoS) parameters that are affected in Video Streaming

network and make this project paper as reference for their study.

LITERATURE REVIEW

This chapter presents the related literature on several areas of study, which includes the definition of pertinent technical terminologies that are used in this research such as Digital Power Line and video streaming. This chapter will also briefly review the description of some known like digital power line, home plug power line, video streaming, types of quality of video services, and technical obstacles of in-home power line networks, similar on-going projects and other related issues which done by Corinex Communication, Power Line Network Standard Debut, and TG Publishing (1996-2005).

METHODOLOGY

This chapter will discuss in details about the steps taken in order to complete this research project successfully. A detail explanation of each phase in realizing the project into real will be discussed along with the algorithm chosen for developing the project, Methodology is a complete structure that has been built to make the result of the research will complete as well as planning. It describes the project flow as well as the approach and method used to accomplish the project. There are three (3) main phases performed during this project and they are:

- Planning
    1) Data Collection
    2) Software and Hardware requirement
- Implementation and Testing
    1) Digital Power Line and Video Streaming implement and configure
    2) Testing performance in Direct LAN.
- Analysis
    1) Data from the analysis are evaluated to gather the findings and a conclusion is made.

There are three network tools that have been used during the testing phases such as Qcheck, Ixia Performance Endpoint version 5.2, and Networx.

ANALYSIS AND RESULT

From the analysis done, noticed that during baseline testing done in apartment home, results for throughput are between 4 Mbps to 5 Mbps. Based on project that has done before with same Qcheck, more than 80 percent of homes the alliance tested saw average throughput of about 5 Mbps and higher numbers of throughput are better. This result same like result done in terrace home which average throughput result are between 4 Mbps to 5 Mbps. The testing done in different floor stated that the average throughput results are from 2.5 Mbps to 3.1 Mbps. The existing project is done in LAN technology shows that the throughput is 0.4 Gbps which the testing done between two switches. Based on the result shown that for every throughput result in baseline and terrace home testing are slightly same with the existing project. Instead of that, the result in LAN is different with the testing done. This is because LAN result testing done between two switches and have many nodes otherwise home plug power line only use two nodes to do testing. And as a

conclusion the higher is the value of throughput to the available bandwidth, the least of packet loss occurs.

During response time; minimum response time, average response time and maximum response time; from the analysis, the lower numbers of each results are better, especially for gaming and any voice or video applications, but anything under 10ms (milliseconds) is fine. Those results refer to existing project. Based on the data that are findings from the analysis, the results from three testing phases the average data minimum response time are below than 10 ms. Basically, from the previous knowledge stated that the higher is the value of a packet response, the poorer is the quality of video in the conversations. From the analysis the maximum response times are more than 10 ms. This is affected the performance of video played to response in long time. As the conclusion, video quality in Direct LAN is good and sometimes highly affected video performance in the network.

From data that are findings from the analysis in streaming test, it shown that when packets travel from source to destination the loss of actual data stream is equal to zero. This is because no packet loss when data stream travel from node to node. During streaming test which actual throughput test done in three testing phases, the results are slightly equal to default data rate 50 kbps. As the conclusion, streaming throughput are good and no data loss occur.

Based on the analysis, the conclusion is when video clip played in the other endpoint, the traffic is increase in baseline testing and decreases in terrace home and different floor testing. This is necessary to consider the environment of home including total voltage, distance, size of building and usage of household appliances.

CONCLUSION

The conclusion covers the overall finding of this research project. As concluded in this chapter, the recommendation is to determine the way on improving this research project with the relation of the future work that can be done by using this research project as a guideline for those whom is interested in this similar project.

RECOMMENDATION

A successful implementation and analysis of this research project has come out to some recommendations. To make this analysis more helpful to similar projects or further study it is recommend that:

a) There are many others quality of service parameters can be used to analyzed video streaming performance over power line such as throughput and response time. Suggestions to analyzing the interference and noise sources which can decrease the performance.
b) It is recommended to future works to add nodes and endpoints when do analysis. This can make the data and result of analysis easy to analyze.
c) It is also recommended to add more power consumption.