

Analysis of Quality of Service (QoS) Youtube Streaming Video Service in Wireless Network in Faculty of Science and Technology UIN Sunan Kalijaga

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Abstract- The growing number of internet users in Indonesia, making the number of users increasing especially video streaming on YouTube service. This increase is based on rapid technological developments, especially PCs, Laptops and Smartphones that use wireless or wireless internet access. The use of streaming video over wireless networks is different from cable networks because the characteristics of wireless networks are limited compared to wired networks. Furthermore, the characteristics of streaming video transmissions that require different handling rather than transmissions of traditional text, and data. This research method uses video quality with 360p, 480p, and 720p. The QoS parameters, which are analyzed are delay, jitter, throughput, packet loss and bandwidth using Wireshark and Net Tools for the testing phase. The results of analysis using QoS for streaming video shows the performance of wireless network services at Faculty of Science and Technology UIN Sunan Kalijaga is still not maximal. This result is especially obtained from video with 480p quality, that has a 20ms delay and a jitter quality level -0.0269ms. According to TIPHON those results are very good. The amount of throughput is 0.55 MBps throughput and the percentage is 3% and the packet loss value is 28%, if it is categorized by TIPHON standardization bad this value falls into the category. For the average bandwidth used is 329 714 bps value.

Keywords- streaming video; action research; QoS; delay; jitter; throughput; packet loss; bandwidth

I. INTRODUCTION

Information technology needs to provide information quickly and cheaply. The computer network is not only used for Internet access only, but can also be used on a local network either at enterprises, institutions, or governments. The computer network provides benefits to its users. The presence of the Internet in a corporate environment, colleges, schools, and other institutions is strongly needed since this information technology has made it is easier to support the process of communication. It can be seen from the use of the Internet network either in public or private, the high demand for access and communication, the performance of the network should be in good condition. Internet network itself is a network between computers connected to one another and to exchange information via hardware such as modems, routers, and so on. Then the Internet network service providers should be able to solve the main problem of providing a good service performance in order to provide convenient services to users. YouTube is a video website most visited and is the most visited sites to two in the world after Google, according to a survey Techno-Okezone. Indonesia's own recorded into countries that control the growth of the number of videos uploaded YouTube users in the Asia Pacific region, Head of Marketing at Google Indonesia Veronica Utami revealed an increase in Indonesia from year to year to reach 600% based on data from the third quarter of 2015 compared to the previous year. This growth was three times bigger than any other country in the Asia Pacific [1].

UIN Sunan Kalijaga is one of the state universities in Yogyakarta are using Internet network services to support the process of academic activities. Therefore, Internet network are needed by students, faculty, or staff at UIN Sunan Kalijaga. UIN Sunan Kalijaga uses network services Wireless (Wireless) to support facilities and pre-academic means. Local based services Wireless (LAN) is a network with a medium in the form of electromagnetic waves. Network cables are not required to connect between computers because it uses electromagnetic waves that send signals between the network computer information.

Therefore to determine the quality of LAN at UIN Sunan Kalijaga to do an analysis of network performance that emphasizes how monitoring and measure performance of LAN and to find out how much the performance of the network can use the parameters of QoS (Quality of Services). Based on the above, this research entitled "Analysis of Quality of Service (QoS) Service Video Streaming Youtube On Wireless Network in Environmental Science and Technology Faculty of UIN Sunan Kalijaga".

II. PURPOSE

The purpose of this study was to measure the parameters of QoS wireless network services in environments UIN Sunan Kalijaga on service Video Streaming (YouTube).

III. METHOD

The method used in this research is the study of action or Action Research. In Figure I Action research is divided into 5 stages which are a research cycle: Diagnosis, Action Plan, Take Action, Make Evaluation, Learning.

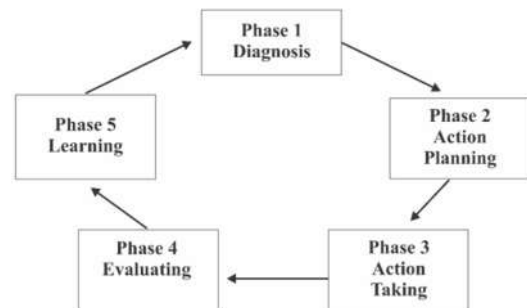


Figure I Flowchart method

IV. RESULT AND DISCUSSION

QoS is the ability of a network to provide a good service to provide bandwidth, addressing Jitter and Delay. QoS parameters are latency, jitter, packet loss, throughput, MOS, echo cancellation and PDD. QoS is determined by the quality of the network used. There are several factors that can lower the value of QoS, such as attenuation, distortion, and Noise [2].

Performance refers to levels of speed and reliability of delivery of various types of load data in a communication in this study refers to the standardization TIPHON (Telecommunications and Internet Protocol Harmonization Over Networks), TIPHON is an initiative proposed by ETSI (European Telecommunications Institute satandard) which is a telecommunication standardization bodies, TIPHON standard designed to support voice communications market and related multimedia aspect among users of IP-based networks and circuit switched network users. The performance is a collection of some of the technical parameters, in this case referring to previous studies major problem of QOS is Delay, Packet loss, throughput and bandwidth therefore in this study referenced several parameters have been represented for network quality testing.

Delay or time delay is the time it takes a packet of data to travel from origin to destination. Delay can be affected by distance, physical media, congestion or too long processing time [2].

Jitter Delay variation is usually called, is closely linked to Delay, Delay indicated considerable variation in taransmit data in a network. Queues that occur on network devices such as routers and switches can cause jitter. The emergence of jitter caused by variations in the length of the queue, the data processing time, and also in the accumulation of the packets at the end of the trip Jitter [3].



Throughput is the effective data transfer speed, measured in bps (bits per second). Throughput is the total number of successful packet arrival observed on goal during a certain time which is determined by dividing the duration of the predetermined time [2].

Packet loss is a parameter that describes the conditions that indicate the total number of packets lost, packet loss can occur due to collisions and queues that occur on the network, it affects all applications for delivery re-package will reduce overall network efficiency even though the amount of bandwidth is available for the application. in general, network devices have a buffer to hold the received data. If congestion long enough, the buffer will be full, and the new data will not be accepted.

Bandwidth is the number of data packets consumption per unit of time expressed in units of bits per second (bps). Bandwidth could mean also the capacity or the capacity of the Ethernet cable in order to pass a certain amount of data traffic. Internet bandwidth provided by the internet provider with a certain amount depending on the rental customer [4].

Simply Bandwidth is the large size of data or information that can flow from one place to another in a network at any given time. Bandwidth can be used to measure both the flow of data both analog and digital data. But in its application itself has become more common if the bandwidth is used to measure the flow of digital data [5].

Wireshark is the analyzer for packet sniffer is a tool to analyze the condition of the computer network. Wireshark is able to capture packets of data / information that runs in the network will be analyzed. All types of packet protocols of information in various formats will be easily captured and analyzed [6].

Before committing to measure parameters of QoS wireless network services in environments UIN Sunan Kalijaga in Streaming Video service. Researchers first measurement SUKANet WiFi network to be able to know the current time SUKANet WiFi network users. Data obtained from the measurement results can be seen in Table I.

TABLE I DATA USER TRAFFIC WI-FI

| NO | NO MAC ADDRESS | 9 a.m. to 11 a.m. | 12:00 to 14:00 | 15:00 to 17:00 |
|---------------------|------------------|-------------------|----------------|----------------|
| 1 | AP2894.0f58.debe | 16 | 23 | 4 |
| 2 | AP2894.0f58.ddf4 | 19 | 10 | 9 |
| 3 | AP2894.0f58.dd71 | 14 | 36 | 27 |
| 4 | AP2894.0f63.d802 | 28 | 28 | 32 |
| 5 | AP2894.0f58.dcf5 | 12 | 13 | 14 |
| 6 | AP2894.0f63.d69a | 19 | 10 | 8 |
| 7 | AP2894.0f58.dd8d | 24 | 33 | 20 |
| 8 | AP2894.0f63.d800 | 11 | 6 | 6 |
| Total (User) | | 143 | 159 | 120 |

Based on data obtained from a previous study we can conclude that the current time is the network users on the morning 09: 00-11: 00, then at 12: 00-14: 00 and the afternoon at 15: 00-17: 00 this data will will become a reference for the observation time Saintek WiFi network for 5 days active time lectures [6].

Then, researchers prepare devices and software for testing the QoS. The device used in this study are:

1. Hardware
The hardware used for research that use:
 - Asus Laptop K45DR with specifications:
processor: AMD A8-4500 APU with Radeon™ HD Graphics (4 CPUs), ~ 1.9GHz
RAM : 4.00 GB
BIOS : 08/02/13 10:36:29 ver: 04:06:05
Graphics : AMD Radeon HD 7640G + 7470M Dual Graphics
2. Software
The software to be used in this research are shown in Table II.

TABLE II SOFTWARE SPECIFICATION

| No. | Software | Keterangan |
|-----|-------------------|---|
| 1 | Win 7 Ultimate | Oprasi System For Laptop Streaming |
| 2 | (Wireshark) 2.4.1 | Tools for capturing packets Video Streaming |
| 3 | Command Prompt | Tools to find ip address Youtube content |
| 4 | Axence netToos 5 | Tools for testing Bandwidth and Packet loss |
| 5 | Ms Office 2013 | Tools for data recap report |

The results of the QoS measurements using the parameters Delay, jitter, throughput, packet loss, and bandwidth obtained through measurement will be calculated using a mathematical formula that exist in every parameter. The measurement results using SUKANet WiFi QoS parameters in the Faculty of Science and Technology, further categorized according to TIPHON standards. In Table III presents data on the average results of measurements with Youtube streaming service on video quality was determined using a WiFi network environment SUKANet Saintek faculty.



TABLE III MEASUREMENT SUKANET WIFI

| QoS Measurement Service Video Streaming | | | | | | |
|---|------------------|-----------------------|-------------|-------------------|-----------------|-----------------|
| No. | resolution Video | parameter Measurement | | | | |
| | | Delay (ms) | Jitter (ms) | Throughput (Mbps) | Packet loss (%) | Bandwidth (bps) |
| 1 | 360p | 17 | 0.0091 | 0:50 | 25 | 290 522 |
| 2 | 480p | 20 | -0.0269 | 0:55 | 33 | 329 714 |
| 3 | 720p | 17 | -0.0092 | 0.98 | 25 | 315 285 |

Measurements made over a period of 5 days with WiFi SUKANet obtained Delay by 17 ms in the test video at 360p, 20 ms at 17 ms video at 480p and 720p quality video testing. Values in the test video with the quality of 480p is greater when

compared with others, but in the use of streaming services themselves this value is not so influential and perceived by the user, from the standardization category of TIPHON all this value in the category very good as shown in Table IV.

Table IV Category Delay SUKANet WiFi

| No. | Parameter | Quality Video | QoS measurement | Category TIPHON |
|-----|-----------|---------------|-----------------|-----------------|
| 1 | delay | 360p | 17ms | Very good |
| 2 | | 480p | 20ms | Very good |
| 3 | | 720p | 17ms | Very good |

Jitter measurements on the value of using a WiFi network environment SUKANet Saintek on Youtube video streaming with video quality 360p, 480p and 720p in getting the Jitter values of 0.0091 ms on testing video at 360p, -0.0269 ms Reviewed and 480p video -0.0092 ms at 720p quality video test,

in this test there is some value minus, if referring to some sources [3] minus value because they happen so fast Jitter then its value becomes minus, if in the standardization TIPHON this value in the category very well while in testing video at 360p enter both categories, shown in Table V.

Table V Category Jitter SUKANet WiFi

| | Parameter | Quality Video | QoS measurement | Category TIPHON |
|---|-----------|---------------|-----------------|-----------------|
| 1 | jitter | 360p | 0.0091 | Well |
| 2 | | 480p | -0.0269 | Very good |
| 3 | | 720p | -0.0092 | Very good |

Measurements in Table V are carried out over a period of 5 day from 9 a.m. to 5 p.m. on a predetermined video quality with SUKANet WiFi of 0.50 MBps throughput obtained in the test video at 360p, 0.55 MBps on 480p video and 0.98 in the test video with 720p quality. According to research [7], throughput of the result is then divided by the speed of Internet access were tested using speed test application that is 17.7 MBps to find the percentage of throughput. The results of the

percentage of throughput obtained the value about 2% in the test video at 360p, 3% at 480p video testing and 5% in the test video with 720p quality. From the test results it can be concluded that by standardizing TIPHON SUKANet WiFi Throughput at all the tested quality vido into the category of bad. SUKANet WiFi network then still not up to serve the needs of internet access at high user traffic. Table VI shows SUKANet WiFi Throughput category according TIPHON.



Table VI Categories SUKANet WiFi Throughput

| No. | Parameter | Quality Video | QoS measurement | Category TIPHON |
|-----|------------|---------------|-----------------|-----------------|
| 1 | throughput | 360p | 2% | Bad |
| 2 | | 480p | 3% | Bad |
| 3 | | 720p | 5% | Bad |

Packet loss measurement using SUKANet WiFi network Packet loss values obtained by 25% in the test video at 360p and 720p, while in 480p quality video with test Packet loss value increased to 33% in the standardization TIPHON all this makes

a bad category. From the results, obtained quality of services provided SUKANet WiFi is far from a given standardization and the need to further improve. Table VII shows the category packetloss SUKANet according to TIPHON.

Table VII Category paketloss SUKANet WiFi

| No. | Parameter | Quality Video | QoS measurement | Category TIPHON |
|-----|-------------|---------------|-----------------|-----------------|
| 1 | packet loss | 360p | 25% | Bad |
| 2 | | 480p | 33% | Bad |
| 3 | | 720p | 25% | Bad |

Based on the results of measurements and tests in the research that has been done, the performance of the video streaming service on SUKANet WiFi in the faculty of Science and Technology UIN Sunan Kalijaga has the lowest Throughput quality level is 2% which is in testing video at 360p. In this case needs to be improved so that services can meet the needs of Internet services with the maximum high user traffic. Large Delay of the largest is 20 milliseconds in testing quality video 480 if categorized according to TIPHON excellent standardization. For all tests Jitter measurements categorized as very good even though the test video at 360p value will be higher, but still in the good category. Packet loss on the measurement of all values obtained in the category of bad, Packet loss than that value in testing the 480p quality video with greater when compared with other test is 33%. This is because many users are accessing the network services of temporary internet services could not anticipate this. Factors that influence is the occurrence of a collision / collision between the data on the network that can affect all of the applications on the Internet, although the amount of sufficient bandwidth available for such applications. In general, network rank have a buffer to store data received or disposal of the package in the terminal to wait for the last packet arrived. This is because many users are accessing the network services of temporary internet services could not anticipate this. Factors that influence is the occurrence of a collision / collision between the data on the network that can affect all of the applications on the Internet, although the amount sufficient bandwidth available for such applications. In general, network rank have a buffer to store data received or disposal of the package in the terminal to wait for the last packet arrived. This is because many users are accessing the network

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V. CONCLUSION

Based on the results of measurements and tests in the research that has been done can be concluded that the performance of Internet services in SUKANet WiFi in the Faculty of Science and Technology UIN Sunan Kalijaga on the video streaming service YouTube by using QoS, it can be concluded that the performance quality of network services SUKANet WiFi has a quality level is not maximized when referring to TIPHON quality standards because there are two parameters that are categorized as poor. It is necessary to repair service to meet the needs of Internet services with the maximum high user traffic. and SUKANet WiFi network administrators need to follow in order to provide optimum service to the user SUKANet WiFi to support the streaming process smoothly.

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