ANALYSIS OF WIRELESS LAN NETWORK QUALITY OF SERVICE IN PGRI YOGYAKARTA UNIVERSITY

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Abstract— **PGRI University of Yogyakarta is an educational institution that uses the internet as one of the supporting facilities and infrastructures to manage and organize the data and information used by the student to find references about the lecture. PGRI University Yogyakarta has three buildings on the main campus building A building B and C buildings, where each building using wireless LAN as a means for students to use the internet network, the weakness of the wireless LAN network where poor internet network in the wireless LAN network. Thus the researchers wanted to analyze the Quality of Service wireless LAN networks in building A, building B, and C buildings, in each floor.**

With the existence of quality of the network at PGRI University of Yogyakarta will be done by interviews and observation methods, problems that occur in wireless LAN networks in each building have been prepared in advance, after which it will do an analysis of wireless LAN networks using quality of service parameters, namely delay, packet loss, bandwidth, throughput and factors that influence the wireless network at the University of PGRI Yogyakarta.

The results of the measurement and monitoring of Quality of Service wireless LAN at PGRI University of Yogyakarta in building A, building B, C on each floor of the building can be classified in the category of poor with the average delay for each building to around 150 ms and packet loss = 28%, bandwidth = 173523 bits / s and throughput = 22%, and the factors that occurred in the signal range cannot cover every room in every building. From these results it can be concluded that the quality of the wireless LAN at the University PGRI Yogyakarta according to the TIPHON standards categorized as poor.

Keywords— bandwidth, delay, packet loss, Quality of Service, throughput, Wireless LAN.

I. INTRODUCTION

Over time, information technology has become an important part of our lives where everyone at this time uses information technology. The basic principle in this network system is the process of sending data or information from the sender to the recipient through a particular communication medium.[12][14][16][18][20] With the quality of a good computer network, it can help agencies in data management or information exchange will work well. One of them is Yogyakarta PGRI University which is an institution in the field of education that uses the internet to organize and manage data and information and is used to support student studies in finding data and materials available on the internet. For internet network management, PGRI University has two networks *wireless* that are managed. The first is managed by PT Sejahtera, on wireless managed by PT Sejahtera students and lecturers are charged for each semester. *The wireless* seconds managed by the campus itself but   students and lecturers are not charged. [1][3][5][7].

Network mikrotik *wireless* This uses a *router* as a division of bandwidth with a *bandwidth* of 70 *mbps. bandwidth* This is divided into LAN (*Local Area Network*) and *wireless LAN networks* . For network performance testing can use QoS (*Quality of Service*).[2][4][6][8][10] QOS (*Quality of Service*) itself is a form of service guarantee or quality of a network, where with the services provided, network users can get the quality of a network with services provided from the network itself. [11][13][15][17][19].The quality of the network that is provided itself is the way of an agency in providing services in and to the scope of a network in its scope, which later *QoS* this is used to determine the quality of the network quality. *wireless LAN* in every building at Yogyakarta PGRI University.

II. RESEARCH OBJECTIVES

Based on the above problems, the purpose of the research is to find out how well the network performance *wireless* and what factors influence the performance of the network *wireless* on the campus of Yogyakarta PGRI University.

III. METHODOLOGY

Research using literature that this method is seeking information from books, internet and final, article concerning about the *quality of service* a network *wireless* and Internet network that can support.

And the interview method is conducting interviews with internet network managers, namely administrators or network managers of Yogyakarta PGRI University, namely by Mr. Edi Iswanto S.kom, and also Mr. Pepen S.kom, and interviewing several students at Yogyakarta PGRI University will aim to get the data we need and clear and precise information that can later be used for research.

While the observation method is defined as systematic observation and recording of symptoms that appear in research subjects or collecting as much data as possible.
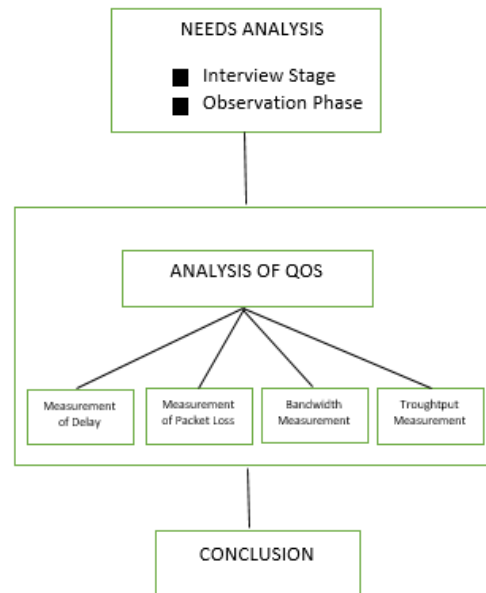

Figure 1. Analisis Kebutuhan

IV. RESULTS AND DISCUSSION

Needs analysis is carried out using two stages, namely interviews and observations. At the interview stage, interviews were conducted with administrators or network managers of Yogyakarta PGRI University. From the interview, it was found that the network was managed in the 3rd floor C building PPTIK room with ISP Telkom internet at 50 *Mbps* and ISP Itrabat at 20 *Mbps* and the *hardware* used was the *Mikrotik Rooter, Switch, sectoral antenna*, and also the Omni antenna as signal amplifier. For the picture of the network structure can be seen in Figure 2 and also figure 3.

Figure 2. Network Structure 1

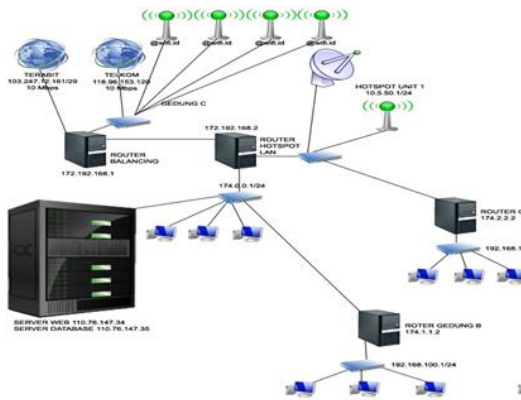| 3	Building A	196	Bad
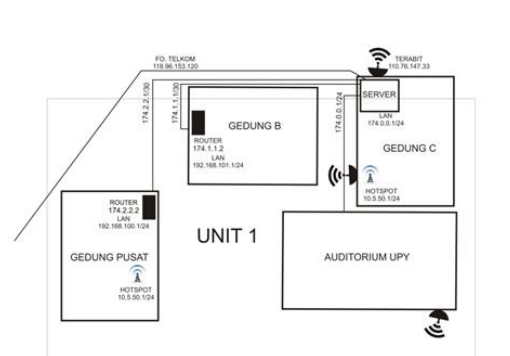
Figure 3. Network Structure 2

From Figure 2 it is seen that the server installed in building C with *wireless* in building C was installed on the 2nd floor using RB 433 router assisted by sectoral antennas for signal amplifiers and also the help of 3 omni antennas installed outside the building adjacent to building B. Observations were made by going directly to 3 buildings, namely building C, building B, and building A, with a comprehensive area of Yogyakarta PGRI University of 500 X 300 m² and an average of 400 students per building.

A. QoS Analysis (Quality of Service)

From the results of QoS (*Quality of Service*) analysis for measurement of *delay, packet loss, bandwidth, and throughput,* at the central campus of Yogyakarta PGRI University conducted in building C, building B, and Building for 5 days from hours 8:00 a.m. - 2:00 p.m. based on the TIPHON standard (*Telecommunications and Internet Protocol Harmonization over Networks*) can be seen as follows:

B. Tracking Results Tracking

Results in each building that is building C, building B, and building A can be known for the path that the packet passes from the laptop IP to the IP Hotspot the same is through 7 IP lines. The results of the measurement of delay, packet loss, bandwidth, throughput can be seen as follows:

1) Delay measurements

In the delay measurement, later will use standardization according to the TIPHON version then the amount of delay can be classified as very good category if <150 *ms*, good category if 150 *ms* - 300 *ms*, medium if 300 *ms* - 450 *ms*, and bad if> 450 *ms*.

Table 1 Results of recapitulation *delay of* each building

No	Building	Average delay	Description
1	Building C	120	Good
2	Building B	148	Good

From the results of table 4.13 it can be seen the results *delay* in building C and Building B for good TIPHON standards, and for building A is in a bad category.

2) Inquiries Packet loss

And to determine the quality of a network on a *packet loss* standard TIPHON has provided the category of *packet loss is* very good if it ranges from 0%, good = 3%, medium = 15%, and bad = above 25%.

Table 2 Results of recapitulation of packet loss for each building

No	Building	Average packet loss	Description
1	Building C	35%	Bad
2	Building B	27%	Bad
3	Building A	28%	Bad

From the results of table 4.14 it can be seen the results of *packet loss* in building C, building B, and building A, for the central campus of Yogyakarta PGRI University for the bad TIPHON standard.

3) Bandwidth Measurement

Measured in bps and measurement *bandwidth* by using application *axence nettools* by using bandwidth tools for measurement.

Table III Results of bandwidth recapitulation of each building

No.	Building	Average bandwidth
1	Building C	195398 bit/s
2	Building B	223426 bit/s
3	Building A	101744 bit/s

From the results of table 4.15 it can be seen the average *bandwidth of* each building at the Yogyakarta PGRI university.

4) Measurement of Throughput

Throughput: the data offered by the operator x 100%, and then the research will be conducted on the main campus of Yogyakarta PGRI University in each building.

Table IV Results of recapitulation *throughput of* each building

No	Building	Average Throughput	Description
1	Building C	23%	Bad
2	Building B	24%	Bad
3	Building A	20%	Bad

From the results of table 4.16 it can be known results *throughput* in building C, building B, and building A , for the central campus of Yogyakarta PGRI University, for the TIPHON standard, it is in a bad category.

V. CONCLUSION

From the previous discussion, it can be concluded that measurements for networks *wireless LAN* at Yogyakarta PGRI University use QoS (Quality of Service) method with parameters of *delay, packet loss, bandwidth,* and *throughput* where measurements are measured for 5 days on each floor for each building. With the result of *delay* for building C = 120 *ms*, building B = 148 *ms*, and building A = 196 *ms*, produce building data A performance is *delay* not good, and for buildings B and C get good performance. Whereas for *packet loss of* building C = 35%, building B = 27%, and building A of 28%, for the throughput of building C, B and A results are: 23%, 24%, 20%. So that the performance of *packet loss* and *throughput* according to TIPHON standards is not good enough for bandwidth, the average bandwidth is 195398 bit / s for building C and building B, building A bandwidth average is 223426 bit / s and 101744 bit / s. It can be known for QoS (*Quality of Service*) the network performance *wireless* for the PGRI Yogyakarta university according to the TIPHON standard as a whole including the less good category.

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