ANALYSIS OF NETWORK PERFORMANCE AT SMKN 1 TAKENGON

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Abstract

The Internet Service Provider has the duty as an internet service provider to make comfort and satisfaction of its customers by providing fast and reliable internet access services. There are two important factors in internet speed, namely upload speed and download speed. Bandwidth capacity is the most influential thing to increase the effectiveness of internet speed. This research aims to analyze throughput and delay of internet network using QoS (Quality of Service) parameters. Wireshark is used in measuring the performance of this network. The research was conducted at the computer laboratory of SMKN 1 Takengon. The results of data analysis suggested that the network performance at SMKN 1 Takengon using throughput and delay parameters is in the feasible and very good category where throughput has the average index is 3.8 in the good category. While for delay, it is getting an average index of 4 which is in the very good category.

Keywords: quality of service, delay, throughput

1. Introduction

The development of computer network technology is currently needed to meet the quality and quantity of fast and reliable internet access [1]. There are many requests for internet access for universities, office areas, schools and for various activities that require very fast quality internet access to support their work.

In the process of communicating to be able to send or receive information, good service performance is needed to support a communication process so that the information to be conveyed can be received properly [2]. ISPs or Internet Service Providers who serve as information service providers are trying every way to fulfill the comfort and satisfaction of their customers so that they can always access the internet. The Internet or Interconnection networking is a whole unit of computers that can be connected to communicate based on the global standardization of TCP/IP (Transmission Control Protocol/Internet Protocol Suite) functions in terms of serving billions of users around the world for packet switching (packet switching communication protocol) [3]. There are two most important factors for internet speed, namely upload speed and download speed. Bandwidth capacity is something that is most influential in increasing the effectiveness of an internet speed. The term used to describe the amount of data or information sent in a unit of time symbolized by bits per second (bps), Kilobits per second (Kbps) and Megabytes per second (Mbps) through an internet connection is called bandwidth [4].

The method used to measure network quality and also one of the attempts to explain the criteria and characteristics of a service is called Quality of Service (QoS). This method is used to test or measure a group of work attributes that have previously been detailed and collected by a service. QoS refers to the ability of a network to provide better service to certain network traffic through different technologies, besides that the Quality of Service method also has the ability to describe the attributes that have been provided for network services quantitatively and qualitatively [3].

In this study, to determine the quality of internet network services, there are two parameters that will be used, namely throughput and delay according to Telecommunications and Internet Protocol Harmonization Over Network (TIPHON) standards. Quality of Service (QoS) is

designed to make it easier for clients (end users) to be more useful by ensuring that users (users) get reliable performance through network-based applications. The purpose of QoS analysis is to be able to monitor the quality of services provided by ISPs (Internet Service Providers) and network operators. The tool used by administrators to monitor the network is Wireshark.

Wireshark is software that analyzes free and open source packages. This application is very useful for administrators because it is used in solving problems that exist in the network, monitoring the network, analyzing network performance and monitoring data travel in the network that is set by wireshark [5]. The Wireshark tool can also capture data and information packets that are currently running in a wireless local area network (WLAN) network.

SMK Negeri 1 Takengon has 4 buildings, 3 floors and 2 computer labs, each consisting of 30 computers with a total number of students of 1,232. To fulfill every learning activity that takes place, this school has built a network service. Of the 33 study groups at the school, there are several departments that use the lab regularly for practicums including multimedia and computer network engineering. Then the accounting, banking and office administration departments also alternately use the computer lab for data processing and searching for information obtained via the internet.

Slow internet network access makes students feel dissatisfied, apart from that there are also several problems and disturbances that occur on wire and wireless networks and these are difficult to avoid, as a result of these disturbances the performance of a network decreases. To determine the effectiveness of a network can be measured through parameters based on the performance of the network. In order to maintain network access so that it remains stable in using the internet network, it is necessary to analyze and test network performance or Quality of Service at SMK N 1 Takengon so that problems that often occur such as delays in data transmission can be minimized so that the management of internet service quality can function properly.

From these problems, the researcher is interested in analyzing and measuring performance on internet network services at SMK N 1 Takengon to see the smooth use of the internet network. The performance measurement in question is Quality of Service (QoS) which consists of Throughput and delay in the SMK N 1 Takengon environment so that the quality of internet network service can be known according to the percentage of the Quality of Service standardization.

2. Method

In order to get maximum results, it is necessary to carry out the steps of activities in carrying out this final project. The steps consist of:

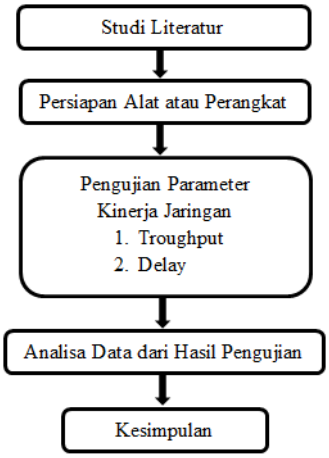

Figure 1. Research Method

2.1. Literature Review

Literature review is looking for theoretical references related to the cases or problems found. The reference contains about:

1. Computer networks
2. Quality of Service (QoS) parameter
3. Wireshark

In looking for these references, we go through books, journals, research report articles, sites and tutorials on the internet. The output of the literature study discussed in this study is to collect references that are relevant to the formulation of the problems discussed.

2.2. Devices Preparation

The following hardware and software are used to measure and analyze internet network services. The devices used are as follows. Laptop HP 64-bit operating system, x64-based processor Intel® Core™ i5-8250U CPU @ 1.60GHz 1.80, 4.00 GB RAM and 1 TB hard drive. Windows 10 Operating System and Wireshark 3.6.5

2.3. Network Parameter Testing

Quality of Service (QoS) is a technique for measuring how good a network is and attempts to define a characteristic and device of a service. QoS is used to measure a certain set of performance attributes associated with a service [6]. The QoS parameters that will be measured include:

a. Throughput

Throughput is the effective data transfer rate in bits per second. Throughput is the total number of packets that are observed to successfully reach their destination in a certain interval divided by the duration of that interval [7].

Table 1. Throughput standard

Category	Troughput	Index
Very good	100 %	4
Good	75 %	3
Average	50%	2
Bad	<25%	1

b. Delay

Delay is the time it takes data in the range from the starting point to the center point. The factors that affect delay include: distance, physical media and also quite a long processing time [8].

Table 2. Delay standard

Category	Delay	Index
Very good	<150 ms	4
Good	150 s/d 300 ms	3
Average	300 s/d 400 ms	2
Bad	>450 ms	1

The application used in testing internet network analysis using QoS parameters which include Throughput, Packet Loss and Delay is Wireshark [2].

3. Results and Discussions

Based on the results of data collection that was carried out during the research, the parameter measurements based on Quality of Service were obtained as follows:

a. Throughput

From the results of data retrieval throughput based on the large number of packets or data that reaches the recipient within a predetermined period of time. The measurement results are presented in Table 3 below.

Table 3. Troughput Measurement Results

Day	Application	Throughput		
		Value	Index	Category
Monday (1)	Zoom	1,155 Mbps	3	Good
	Google Meet	2,125 Mbps	4	Very Good
	Youtube	3,08 Mbps	4	Very Good
Tuesday (2)	Zoom	8,42 Mbps	4	Very Good
	Google Meet	3,488 Mbps	4	Very Good
	Youtube	5,32 Mbps	4	Very Good
Wednesday (3)	Zoom	6,85 Mbps	4	Very Good
	Google Meet	2,071 Mbps	4	Very Good
	Youtube	1,450 Mbps	3	Good
Thursday (4)	Zoom	7,36 Mbps	4	Very Good
	Google Meet	3,599 Mbps	4	Very Good
	Youtube	3,81 Mbps	4	Very Good
Friday (5)	Zoom	1,328 Mbps	3	Good
	Google Meet	2,125 Mbps	4	Very Good
	Youtube	6,15 Mbps	4	Very Good

From Table 3 the results of the throughput test at the Computer Lab SMKN 1 Takengon which has been researched for 5 days shows that the resulting throughput value with index 4 is a very good category and index 3 is a good category, this shows that the performance or quality of the network in the laboratory belong to the very good category.

For testing on Zoom and Youtube on Mondays, Wednesdays and Fridays who get good categories with index 3, get these results because fair queues are not given, users who send large packets will get higher bandwidth. Apart from this, other factors can also be caused by network quality and during peak hours, the internet will be slow, possibly because the ISP's bandwidth allocation is congested. So that data packets sent or received experience pending [14].

b. Delay

The following delay measurement results are presented in Table 4 below:

Table 4. Delay Measurement Results

Day	Application	Delay		
		Value	Index	Category
Monday (1)	Zoom	7 ms	4	Very Good
	Google Meet	2 ms	4	Very Good
	Youtube	23 ms	4	Very Good
Tuesday (2)	Zoom	33 ms	4	Very Good
	Google Meet	2 ms	4	Very Good
	Youtube	14 ms	4	Very Good
Wednesday (3)	Zoom	8 ms	4	Very Good
	Google Meet	2 ms	4	Very Good
	Youtube	887 ms	1	Bad

Thursday (4)	Zoom	8 ms	4	Very Good
	Google Meet	2 ms	4	Very Good
	Youtube	19 ms	4	Very Good
Friday (5)	Zoom	4 ms	4	Very Good
	Google Meet	2 ms	4	Very Good
	Youtube	9 ms	4	Very Good

The average value of the delay index obtained based on the test results during the study was 4 with a very good category. The average delay value generated from Monday to Thursday is to produce a satisfactory value with a very good index of 4 categories.

Based on network performance test data that has been carried out using the QoS method with throughput and delay parameters that have been tested in the internet network in the SMKN 1 Takengon computer laboratory using the wireshark application, the results showed that it is in accordance with the percentage of Quality of service (QoS) according to standardization TIPHON (Telecommunications and Internet Protocol Harmonization Over Network) and belongs to the category of decent and very good network performance.

4. Summary

Based on the results of network performance testing using the QoS method with throughput and delay parameters at SMKN 1 Takengon, it can be concluded that the parameters used in this test consist of throughput and delay. Get the result that, the throughput value gets an average index of 3.8 in the "good" category. And delay gets an average index of 4, entering the "very good" category. Based on research on testing internet network performance in the Computer Laboratory at SMKN 1 Takengon, there is a suggestion that further researchers are expected to be able to add tests on Jitter Parameters and use testing tools or applications other than wireshark.

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