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Analysis of Internet Service Quality Using Internet Control Message Protocol

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Abstract. Quality measurement needs to be done to determine the level of quality possessed by the system. Quality of Service is a measurement method issued by the European Telecommunications Standard Institute (ETSI). All activities at AMIK DCC utilize internet facilities, such as teaching and learning activities, administrative activities, student unit activities, and libraries. Because to support all these activities need a good and reliable of network. Some students complained about the lack of satisfaction of the internet network on campus.this research will analyze the Quality of Service internet network both wired or wireless in AMIK DCC Building by using Internet Control Message Protocol (ICMP). The data obtained will then be processed for analyzed throughput, packet loss, delay, and jitter to know how the quality of internet services. Based on the measurement, the results obtained that the throughputis 79%, the packet loss under 5%, the delay is below 175 ms and the jitter at 1%. From the results of research, it can be concluded that the Quality Of Service internet network in AMIK DCC included in the category satisfactory by TIPHON standards, but need to add repeaters to defeat the Internet network coverage for every floor and room.

1. Introduction

Computer network technology has penetrated into various fields and aspects of life. This can be seen from the use of computer networks by agencies, groups and individuals. Computer network technology is very important, because the many advantages possessed include easy and efficient process. AMIK Dian Cipta Cendikia provides internet access and facilities for a number of access points that are spread out at certain points so that internet connections are spread throughout all campus area. However, bandwidth management implemented in Shared Unlimited results in "grabbing" bandwidth so that internet access becomes unstable and sometimes even slow when there are many users accessing the same access point at the same time and vice versa. In addition, sometimes WLAN networks cannot be used to access the internet. In some locations there are also areas that have not been covered by WLAN networks or blind spots. From these statements, to be able to maintain the quality of service performance on the WLAN network in Dian Cipta Dian Cendikia always in good performance. It is necessary to monitor and analyze the WLAN network quality of service to minimize and find out network disruptions early. So that the WLAN network can always in maximum performance to be able to support ICT-based education services.Quality of Service (QoS) is a method of measuring how well a network is and an attempt to



define the characteristics and properties of a service. QoS is used to measure a set of performance attributes that have been specified and associated with a service.

QoS refers to the ability of a network to provide better services for certain network traffic through different technologies. QoS offers the ability to define network service attributes provided both qualitatively and quantitatively. Internet quality assessment is usually done using software such as the axence tool, biznet, ipref [1, 2, 3] and wireshark [4, 5]. But in this study researchers tried to calculate the quality of internet services using manual counts according to the formula given by ETSI or TIPHON. The purpose of this study was to determine the quality of service or the quality of the performance of WLAN networks contained in AMIK Dian Cipta Cendikia Lampung.

2. Materials and Methods

2.1. Quality Of Services (QoS)

QoS stands for Quality of Service. QoS is a measure of how well a network is and an attempt to define the characteristics and properties of a service [6]. QoS is usually used to measure a set of specified performance attributes and is usually associated with a service. In IP-based networks, IP QoS refers to the performance of IP packets passing through one or more networks.

QoS is designed to help end users become more productive by ensuring that they get reliable performance from network-based applications. QoS refers to the ability of the network to provide better service on certain network traffic through different technologies. QoS is a significant challenge in IP and internet based networks as a whole. The purpose of QoS is to satisfy different service needs, which use the same infrastructure. QoS offers the ability to define the network service attributes provided, both qualitatively and quantitatively [7].

In terms of networking, Quality of Service (QoS) refers to the ability to provide different services to network traffic with different classes. The ultimate goal of Quality of Service (QoS) is to provide better and planned network services with dedicated bandwidth and controlled latency and increase the lost of characteristics, or QoS is the ability to guarantee the delivery of important data streams or in other words a collection of various sets from various performance criteria that determine the level of satisfaction of a service. The quality level of a network is adjusted to the Quality of Service (QoS) standard through the tables issued by TIPHON . Like the table below.

Table 1. Index Parameters of QoS [4]

Value	Presentation(%)	Index
3,8–4	95 –100	Very Good
3– 3,79	75 –94,75	Good
2– 2,99	50 –74,75	Not Good
1– 1,99	25 –49,75	Bad

2.2. QoS Parameters

2.1.1. Bandwidth

Bandwidth is wide range of frequencies used by signals in the transmission medium. The signal frequency is measured in units of Hertz (Hz).

2.1.2. Throughput

Throughput is the actual (actual) bandwidth that is measured with a specific time unit used to transfer data of a certain size.

Table 2. Index Parameter of Throughput [4]

Category Throughput	Throughput	Index
Very Good	100%	4
Good	75%	3
Fair	50%	2
Bad	< 25%	1

Equation for throughput

$$\text{Throughput} = \frac{\text{total packet send}}{\text{Delay}} \quad (1)$$

2.1.3. Packet Lost

It is a parameter that describes a condition that indicates the total number of packets lost.

Table 3. Index Parameter of Packet Lost [6]

Degradation Of Packet Lost	Packet Lost
Perfect	0%
Good	3%
Medium	15%
Poor	25%

Equation for packet loss

$$\text{Packet loss} = \text{packet send} - \text{packet receive} \quad (2)$$

2.1.4. Delay

Delay is the time it takes the data to travel from the origin to the destination.

Table 4. Index Parameter of Delay [6]

Category of Latency	Delay
Best	< 150 ms
High	< 250 ms
Medium	< 350 ms
Low	< 450 ms

Equation for delay

$$\text{delay} = \frac{\sum_{i=1}^n t_i}{n} \quad (3)$$

2.1.5. Jitter

Jitter is the variance in time delay in milliseconds (ms) between data packets over a network. Jitter is calculated by the total length of time the data is sent minus the average delay, then divided by the total length of time the data is sent. The smaller the jitter value, the better the network will be. Equation for jitter

$$\text{jitter} = \text{total variation of delay} - \text{average} \quad (4)$$

3. Results and Discussion

The results obtained from this study are numbers that show the value of delay, throughput, jitter, and packet loss on 5 different web servers. These servers are, server www.dcc.ac.id, server www.telkom.co.id, server www.tokopedia.com, server www.facebook.com, server www.twitter.com. The process of taking network data is done by using the Command Prompt application. Inside it is given a "ping" command followed by the server IP address to be checked. Then follow the command "-t" and make the file name of the recording. The "-t" command will make the ping process run continuously. While creating a name will make the ping process automatically saved with the name that was previously created. Example "ping 127.240.13.35 -t > facebook.txt". The data recorded in the sample file will be stored in the ".txt" format in notepad. Display data capture exactly the same as the display in the Command Prompt.

Based on the recorded data, a number is taken in the "time" section which has milliseconds, as in the example "Reply from 127.240.13.35: bytes = 32 time = 24ms TTL = 52". The time number is then calculated using Microsoft Excel applications to calculate the value of delay, throughput, jitter, and packet loss. In addition to the four variables that have been predetermined, there are actually other results that arise from the observations, namely General Failure, Destination Host Unreachable, TTL expired in transit, PING: transmit failed, and Destination net unreachable. But the results of these observations were not included in the reporting.

Furthermore, the calculated result data is entered into a graph so that it is easier to understand how the network conditions in the sample days are taken. Given the size and number of graphs that must be displayed, only three graphs are displayed which have the highest fluctuations compared to other charts. Graphs of observations and data retrieval are shown in the image below.

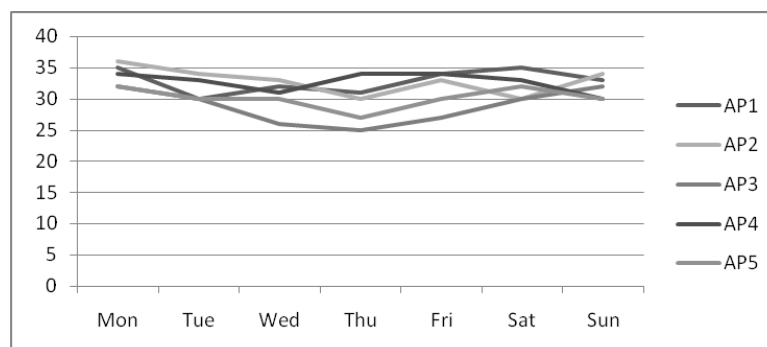


Figure 1. Result for throughput

In the figure 1 above, Y axis is the bandwidth given isp by 40Mb and the received group fluctuated starting from 25 Mb. What is assessed is AP, that is, Access Points that are on the Dian Cipta Cendikia AMIK as many as 6 Access Points. And X axis is the research day d from Monday to Sunday. In the picture above shows, even though the measurement every day shows different values, but the performance of the internet network still tends to be stable.

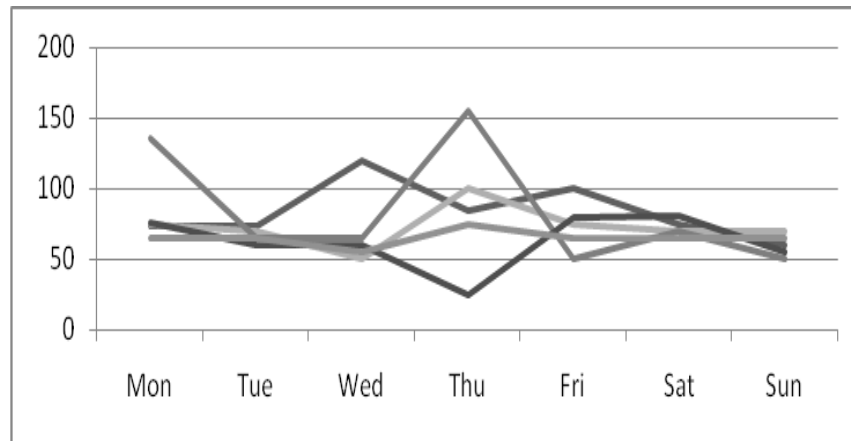


Figure 2. Result for delay

Figure 2 shows the instability of network performance on certain days of the Access Point, because this is affected by the distance from the signal source. The highest delay value is experienced by AP3 due to the farthest distance from the signal source, but the delay value is still below 175 ms.

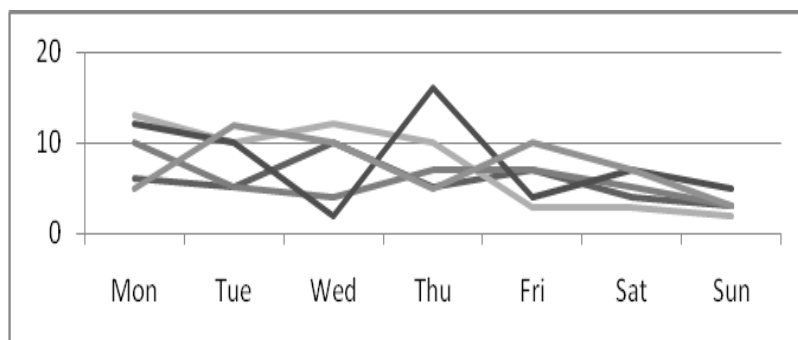


Figure 3. Result for packet loss

Figure 3 above is the result of packet loss calculation. Despite a significant increase, the highest packet value of all Access Points is still below 1%. The rest of the calculations show very stable results.

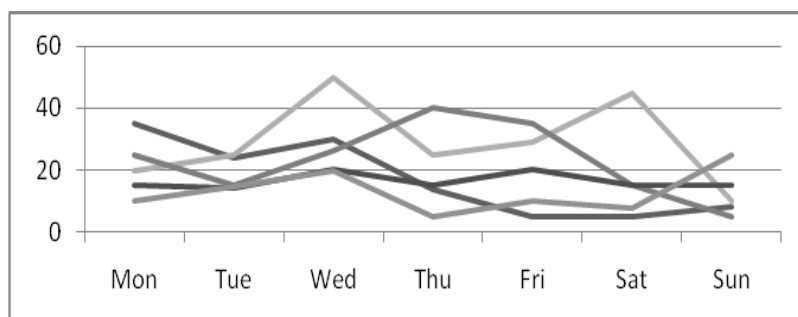


Figure 4. Result for jitter

Figure 4 shows the instability of network performance on certain days in Access Points, because this is affected by the distance from the signal source. The highest Jitter value is experienced by AP3 due to the farthest distance from the signal source, but the delay value is still below 50 ms.

4. Conclusion

From the results of the Quality of Service (QoS) analysis of internet networks at AMIK Dian Cipta Cendikia Bandar Lampung, the following conclusions can be drawn:

1. AMIK computer network Dian Cipta Cendikia Bandar Lampung is good. This was evidenced by the delay value that was under 175 ms. The good category is also shown from the calculation of Packetloss value which is below the 1% mark. And the jitter is not more than 5%. And throughput of 79%.
2. Add a repeater to Access Point 3 so that it is not too far from the signal source.

References

- [1] Wulandari P, Sopian S and Mujur R 2017 Monitoring dan analisis QoS (Quality Of Service) jaringan internet pada Gedung Kpa Politeknik Negeri Sriwijaya dengan metode drive test. *Prosiding SNATIF* pp 341-347
- [2] Simanjuntak, Wati M F, Nurhayati O D and Widiyanto E D 2016 Analisis quality of service (QoS) jaringan telekomunikasi high-speed downlink packet access (HSDPA) pada teknologi 3.5 G *Jurnal Teknologi Dan Sistem Komputer* **4** 1 pp 67-76
- [3] Pranata Y A Fibriani I Utomo S B 2016 Analisis Optimasi Kinerja Quality Of Service Pada Layanan Komunikasi Data Menggunakan Ns-2 Di PT. PLN (Persero) Jember *SINERGI* **20** 2 pp 149-156
- [4] Wulandari R 2016 Analisis QoS (Quality of Service) pada jaringan internet (studi kasus: UPT Loka Uji Teknik Penambangan Jampang Kulon-LIPI) *Jurnal Teknik Informatika Dan Sistem Informasi* **2** 2 pp 162-172
- [5] Saputra L D D 2017 Analisis QoS differentiated service pada jaringan MPLS menggunakan algoritma threshold *Jurnal Teknologi Informasi dan Ilmu Komputer (JTIIK)* **4** 4 pp 227-236
- [6] ETSI 1999 *Telecommunication and Internet Protocol Harmonization Over Network (TIPHON) General Aspec of Quality of Service (QoS)*
- [7] Forouzan A B and Sophia C 2007 *Data Communication and Networking Fourth Edition* (Newyork: McGraw-Hill)