



Bandwidth Management Design Analysis for Computer Network Infrastructure at SMKN 1 Abdya

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ABSTRACT

The need for internet in the learning process has a very significant role so that in its use it is necessary to regulate access and manage bandwidth well for the smooth internet access. This research was conducted to analyze the differences in bandwidth management design for computer network infrastructure in the old design and the new design at SMKN 1 ABDYA. This study aims to see how to analyze the difference in delay and throughput in the bandwidth management design of old and new computer networks. In this study using qualitative research methods where the data obtained by means of observation, interviews and documentation. This research uses the Wireshark version 2.6 application. 6 to see the use of delay and throughput on the bandwidth management design of old and new computer networks. Based on the results of the calculation of the use of delay and throughput using the Wireshark 2.6.6 application, there is a significant difference between the use of delay and throughput in the design of bandwidth management for the old computer network and the design of bandwidth management for the new computer network.

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1. INTRODUCTION

Advances in science and information technology have changed the perspective and lifestyle of the Indonesian people in carrying out their activities and activities. The existence and role of information technology in the education system has brought about a new era of development in the world of education, but these developments have not been matched by human resources (HR) that determine the success of the world of education in Indonesia in general.

Information technology is also growing along with humans who want convenience, speed and accuracy in obtaining information. The media used to convey information also varies, both print media and electronic media. One of the fastest electronic media in conveying information is through the internet network, because the use of the internet network is growing rapidly².

The internet network is a collection of computers and devices that are connected to each other through communication media and transmission media in a wide geographic area³. The Internet is part of a computer network, where the computer network consists of a Local Area Network (LAN), Wide Area Network (MAN) and Metropolitan Area Network (MAN). Of these three types of networks, the computer network that is often used for educational institutions and other public agencies is the LAN network, because the LAN network is a local network that only covers one area or one building.

Computer networks are also one of the network infrastructures, the use of good network infrastructure in designing computer networks is very influential in the use of computer networks in an institution, because if the network infrastructure is designed properly in accordance with the desired institution it will get good results.

The government invites ISP (Internet Service Provider) internet service providers in Indonesia to jointly realize 57% of internet usage. Unfortunately, the ease of internet access does not go hand in hand with the increasing amount of bandwidth available by operators. The high price of bandwidth causes restrictions on the amount of bandwidth provided by the operator. In the merdeka.com article, Arif Piyoto wrote that 60% of bandwidth in Indonesia comes from Singapore. He also explained that in 2006, for every one megabyte (MB), the domestic bandwidth price was around USD 6,000, while from abroad it was only around USD 3,000 to USD 4,000 per 1MB. Without bandwidth management, many computers can use internet unequally, causing other computers to not get bandwidth allotments evenly.

Bandwidth management system is the process of setting the right bandwidth for each client on the internet network system that supports the needs of internet service applications. The implementation of bandwidth management is regulated through the allocation of upload and download speeds to each client's IP address in a centralized manner using a proxy router, which if a client accesses the internet requires a large bandwidth capacity, other clients will be disturbed, because each client already has the capacity. each bandwidth that can be used to access the internet⁷. The results of initial observations made at SMK N 1 ABDYA, many obstacles were seen, frequent interruptions occurred during the learning process in the Lab, lack of internet network support in the school for all computers in the lab, besides that, problems often occur in the slow connectivity of the internet network in schools when students use computer networks simultaneously in the computer LAB which causes bandwidth overload. Actually, it does not require a large bandwidth if it is only for learning about the internet, but various problems will arise such as slow internet connection if many clients access the internet. Most educational institutions use an internet connection from ISP Speedy with bandwidth up to 1 MB and are used by 2 computer labs, each lab has 20 computers in lab 1 and 20 computers in lab 2. but there will be various kinds of problems such as slow internet connection if many clients access the internet. Most educational institutions use an internet connection from ISP Speedy with bandwidth up to 1 MB and are used by 2 computer labs, each lab has 20 computers in lab 1 and 20 computers in lab 2. but there will be various kinds of problems such as slow internet connection if many clients access the internet. Most educational institutions use an internet connection from ISP Speedy with bandwidth up to 1 MB and are used by 2 computer labs, each lab has 20 computers in lab 1 and 20 computers in lab 2.

In addition to the lab there is a hotspot used by students. This will clearly affect the performance of the internet connection of the connected client if the 1 MB bandwidth must be shared to dozens of computers. In dealing with a network whose bandwidth management has not been managed properly, a well-organized network system is needed, such as the use of a router. Routers can be obtained by direct use without having to install the system using a broadband router or you can use a computer to make a router by installing an operating system or software to make a router with a note that the hardware also supports the routing process.

2. RESEARCH METHOD

In this study, the authors used qualitative research, namely research in the form of written words, or oral and the behavior of the people studied. The method used in this paper is a descriptive method. Descriptive method, can be interpreted as a procedure or method of solving research problems by describing the state of the object under investigation (a person, institution, community, factory, etc.) as it is, based on actual facts at the present time. For more details, the authors put forward the notion of qualitative methods which were put forward by several experts, namely:

According to Bogdan and Taylor, the qualitative method is defined as a research procedure that produces descriptive data in the form of speech or writing and the behavior of the people being observed⁴¹. According to Suharsimi Arikunto in the book "Methods of Social and Educational Research" written by Nurul Zuriah, it means that descriptive analysis is a research that collects data from the field and analyzes and draws conclusions from the data⁴². This study uses a qualitative approach aimed at examining the current state of affairs related to "Bandwidth Management Design Analysis for computer network infrastructure at SMKN 1 ABDYA".

Types of research.

In this study, to obtain more accurate data, the author uses field research methods, this method is carried out by observing directly to the research location so that the data obtained is more accurate and objective. To help smooth the research, the author uses library research methods,

namely by searching for data or information by reading reference books and publication materials available in the library related to this thesis.

Research sites

In this study, the researchers took the research location at the SMKN 1 ABDYA school

Research Informants

Informants are important objects in a study. Informants are also defined as people who are used to provide information about the situation and background conditions of the research place. The research targets were the Principal of SMKN 1 ABDYA, network operators of SMKN 1 ABDYA, 3 teachers of SMKN 1 ABDYA and 5 students of SMKN 1 ABDYA.

Data collection technique

Data collection techniques are the most strategic steps in research, because the main purpose of research is to obtain data.⁴³ To obtain valid data for a study, data collection techniques are very helpful and determine the quality of research.

3. RESULTS AND DISCUSSIONS

Problems faced with advances in information technology as it is today, SMKN 1 ABDYA is no longer possible to avoid the use of computer networks. The number of network hosts that are already too complex requires centralized traffic monitoring. What needs to be considered is the scope of the communication area to be related, the network topology, the type of network protocol used, and preparing network hardware that is in accordance with the topology and type of protocol used⁵¹. SMKN 1 ABDYA on the computer network system currently uses the Start topology, but the connection is combined between wireless and LAN. Where wireless is transmitted to the laboratory and laboratory computers that are connected to the network using LAN ⁵². For now, the bandwidth capacity used in the computer network system is 20 mbps, for students to download and upload 512 kbps, while for teachers, download 1 mb and upload 512 kbps⁵³.

This capacity is managed using bandwidth management, thereby reducing the occurrence of bandwidth overload. Bandwidth management is used by dividing bandwidth according to user class and looking at their needs so that they do not interfere with other user access activities. At SMKN 1 ABDYA bandwidth management is used by dividing the limit for usage between teachers and students, so as not to fight over bandwidth and bandwidth becomes overloaded. thereby reducing the occurrence of bandwidth overload. Bandwidth management is used by dividing bandwidth according to user class and looking at their needs so that they do not interfere with other user access activities. At SMKN 1 ABDYA bandwidth management is used by dividing the limit for usage between teachers and students, so as not to fight over bandwidth and bandwidth becomes overloaded. thereby reducing the occurrence of bandwidth overload. Bandwidth management is used by dividing bandwidth according to user class and looking at their needs so that they do not interfere with other user access activities. At SMKN 1 ABDYA bandwidth management is used by dividing the limit for usage between teachers and students, so as not to fight over bandwidth and bandwidth becomes overloaded.

Comparative Analysis of the Old Computer Network Design with the New Computer Network

In the old design, the computer network at SMKN 1 ABDYA has 2 network devices, namely Wireless and Lan. Where wireless is transmitted and connected to every computer Lab, Marketing lab and Electrical Lab. Each Lab uses a LAN (Local Area Network) device to connect to the internet. And only do restrictions (Limit) on each user, while in the new design SMKN 1 ABDYA has 3 networks and 2 of them come from PfSense namely IP addresses 192.168.2.0/26 and 192.168.3.0/27 while address 192.168.4.0/27 is only used in the computer lab 2. PfSense at SMKN 1 ABDYA functions as a dial up to speedy bandwidth management, Pfsense can also be remotely (accessed) from outside the SMKN 1 ABDYA network using Speedy's public IP via GUI-based web or via SSH.

Table 1. QOS Calculation Results (Delay and Thourghput)

No	QOS Calculation	Old Computer Network Design	New Computer Network Design
1	delay	0.208292 ms	0.00319861 ms
2	Thourghput	1158 mbit/sec	4399 mbit/sec

From the table of results of the calculation of bandwidth management (delay and throughput) above, it can be analyzed that the delay in the two computer network designs at SMKN 1 ABDYA

both have very good delay usage, namely throughput of 4399 Mbit/sec while the old computer network design is only has an average throughput of 1158 Mbit/sec.

Discussion

Analysis of bandwidth management that is suitable for the design of computer network infrastructure at SMKN 1 ABDYA is the management of appropriate bandwidth management, if bandwidth management is well managed then computer network connectivity will be more optimal for learning, based on the results of interviews that researchers conducted with network operators at SMKN 1 ABDYA, said that the bandwidth management available at the school is only 20 mbps, therefore the management is carried out by dividing the upper limit for each user, where the user is divided into 2, namely teachers and students, the teacher limits the limit of 1 mbps for download and 512 kbps for upload. Meanwhile, students are limited to 512 kbps for download and 512 kbps for upload. The differences between the old computer network design and the new computer network design are both subject to limit restrictions, it's just that the new computer network design is given the addition of a special squid proxy for the Pfsense router operating system version 2.0.1 which will be used for web caching and also use the squid guard facility which is part of the squid proxy to block sites that are not needed for education such as pornographic sites.

The results of the analysis using the Wireshark application (version 2.6.6) show that the difference between delay and throughput in the old computer network design and the new computer network design is different, where in the old computer network design there is a delay of 0, 208292 ms and a throughput of 1158 Mbit/sec, while in the new computer network design there is a delay of 0.000319861 ms and a throughput of 4399 Mbit/sec. Therefore, with the analysis of the old computer network design and the new computer network design, it can be seen that the new computer network design is more optimal for use in the learning process because the new computer network design limits users (teachers and students), limiting social media applications such as Youtube, Facebook, Instagram and Twitter and also blocking sites that are not educational sites such as sites that smell like pornography. Thus reducing the occurrence of slow connectivity and excessive bandwidth usage if more than 30 users have access.

4. CONCLUSION

Based on the results of the research that researchers have carried out on bandwidth management analysis for computer network infrastructure at SMKN 1 ABDYA, it can be concluded that, the design of computer network infrastructure that has been implemented at SMKN 1 ABDYA often experiences bandwidth overload and slow connectivity due to lack of management in bandwidth management. The difference between the old design and the new design after testing using the speedtest site and the wireshark application (version 2.6.6.) at SMKN 1 ABDYA where the calculation of delay in the new design is less than the old design and the throughput in the new design is greater than the old design.

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