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COMPARISON ANALYSIS OF BANDWIDTH SPEED USING MIKROTIK ROUTERBOARD 750

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Abstract— *The problem being faced by aminet cafes is that every cafe user often experiences problems when using a computer. The network is often disrupted on each computer because the distribution of bandwidth has not been done. In this study, a comparison of upload and download speeds will be carried out when distribution is done. Bandwidth management in this study uses a proxy and Queue Tree with the Network Development Life Cycle (NDLC) system development method. The results of the study show that bandwidth management runs optimally with balanced upload and download speeds for each user because the bandwidth distribution process has been carried out. The average upload speed is 121 kbps and the download speed is 732kbps.*

Keywords: *Aminet, Mikrotik, Queue Tree*

Intisari— *Permasalahan yang sedang dihadapi oleh warnet aminet yaitu setiap pengguna warnet sering mengalami kendala disaat menggunakan computer. Jaringan sering terganggu pada setiap computer dikarenakan pembagian bandwidth belum dilakukan. Pada penelitian ini akan dilakukan perbandingan kecepatan upload dan download ketika sudah di lakukan pembagian. Pengelolan bandwith pada penelitian ini menggunakan mikrotik dan Queue Tree dengan metode pengembangkan system Network Development Life Cycle (NDLC). Hasil penelitian menunjukan pengelolaan bandwitd berjalan optimal dengan kecepatan upload dan download yang seimbang disetiap usernya di karenakan sudah dilakukan proses pembagian bandwidth. Rata-rata kecepatan upload di kecepatan 121 kbps dan kecepatan download 732kbps.*

Kata Kunci: *Aminet, Mikrotik, Queue Tree*

INTRODUCTION

Bandwidth problems are the most common problem that is often encountered in computer network technology, including in Aminet cafes (Prihantoro et al., 2021). At Aminet cafes, bandwidth leaks often occur where users can access the internet without bandwidth restrictions. Bandwidth management at Aminet cafes is currently needed because 90% of Aminet internet cafe users are online game users(Naya et al., 2021). Where the need for the bandwidth for online games must be supported by an optimal internet network so that connection stability is maintained from lag (Dasmen et al., 2022). One way of internet bandwidth management is to limit or limit internet bandwidth(Siddik et al., 2023), so that the total available bandwidth capacity is not monopolized by one or several groups of internet users(Darmadi, 2019). The purpose of bandwidth management itself is to expedite the connection of all computers so that they can access the internet optimally(Arta et al., 2018). Bandwidth management can be done with several software and hardware, one of which is by using the Mikrotik RB 750 router. The MikroTik router(Rahmawan et al., 2022) is known as a router that is economical on hardware, has many features, is easy to configure and can be installed

on a personal computer (Arius et al., 2022). Of the several features of the Mikrotik Router, one of the highlights is the Queues Tree which functions to limit bandwidth on MikroTik(Putra et al., 2020).

The use of Mikrotik with Queues Tree in bandwidth management has been widely carried out by several researchers such as :(Syukur, 2018) in their research applying Mikrotik in internet bandwidth management, but problems occur when applications with different characteristics try to access the internet at one time so management much-needed bandwidth. Similar research was also carried out by (Gunawan et al., 2018) where to increase the effectiveness of using and managing internet bandwidth at Ki Hajar Dewantoro Vocational School by using a Mikrotik Router to make it easier for administrators to manage the network. Likewise, research conducted by (Tantoni et al., 2019)analyzes the need for online game bandwidth speed to be able to manage it so it doesn't lag. Furthermore, research was carried out by (Prayoga, 2021)and (Prihantoro et al., 2021)using a Queue Tree in dividing bandwidth for each internet cafe user and research (Dasmen et al., 2022) overcoming the problem of bandwidth leakage in internet cafes using a proxy.

MATERIALS AND METHODS

A. Research Stages

The research used the Network Development Life Cycle (NDLC) system development method which can be seen in Figure 1.

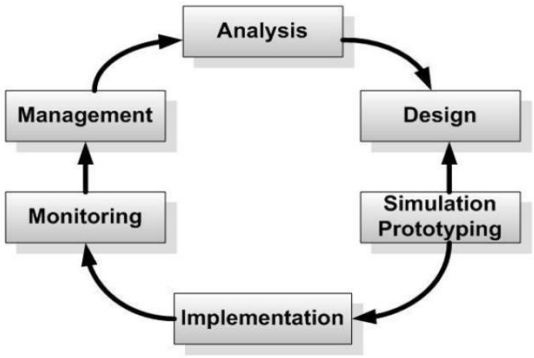

Figure 1. NDLC Model(Rizal & HS, 2019)(Yennimar et al., 2019)

In Figure 1 you can see the stages of the NDLC model where the analysis stage is analyzing system requirements which aims to identify problems and system specific requirements. Furthermore, at the design stage, a work flow system design drawing will be made, the design can be in the form of a topological structure design, data access design, cabling design, and so on which will provide a clear picture of the project to be built. Furthermore, at the Simulation stage, namely describing a prototype which aims to see the initial performance of the research to be carried out and the final stages of implementation. The flowchart of this research can be seen in Figure 2.

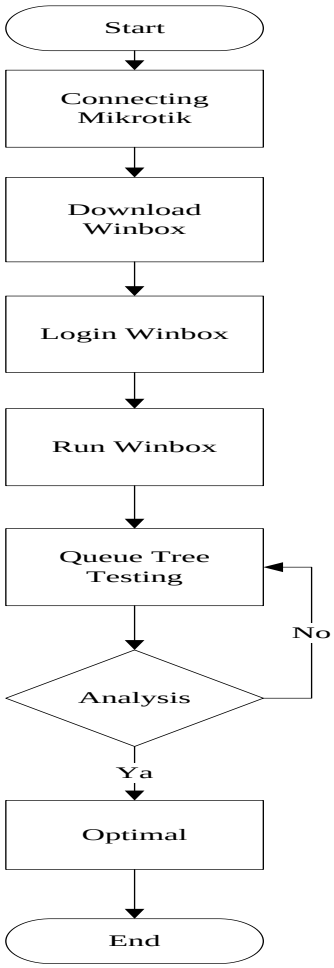

Figure 2. Research flowchart (Rizal et al., 2020)

Figure 2 explains the research design that was carried out starting with connecting the proxy and downloading Winbox and logging in. Then run winbox with the queue tree method. The last stage is to analyze the bandwidth for the eight computers in the cafe and whether it is stable and optimal, the following is an explanation regarding the steps taken:

1. The initial stage is connecting Mikrotik where at this stage it is carried out to be able to start sharing bandwidth on each computer.
2. Download winbox: at this stage it functions to access and manage the MikroTik RouterOS configuration.
3. Login winbox: at this stage to be able to access all the tools available on winbox.
4. Run Winbox: at this stage it is carried out to see the results of the trials that have been carried out whether they are optimal or not.

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5. Queue tree testing: at the stage of starting the process of limiting proxy bandwidth separately for browsing, downloading and online games
6. Analysis: at this stage start doing analysis on 8 computers whether it is optimal. If the process is stopped.

B. Network Design

The design of the network topology used by Aminet cafe uses a star topology where each computer is connected directly to a switch and the switch is directly connected to the modem without a router to properly control the distribution of incoming bandwidth to each computer. The design before and after using the proxy router can be seen in Figure 3 and Figure 4.

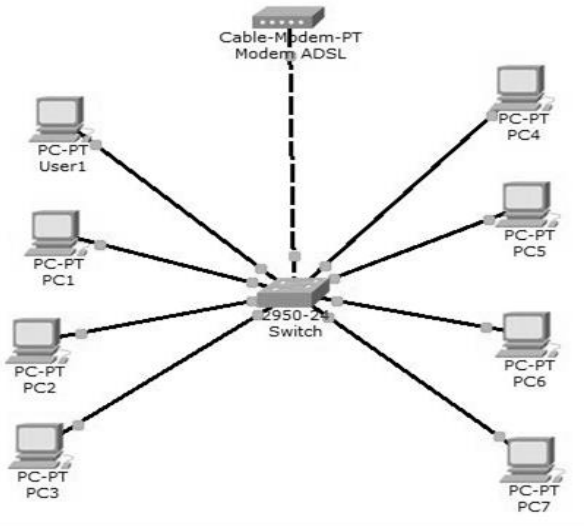

Figure 3. Design before using Mikrotik

In Figure 3 it can be seen the design of the Computer Network before using Mikrotik on the modem device that is used directly connected to the switch/hub device without a router between the modem and the switch, so that the switch is directly connected to the user's computer without any bandwidth controller.

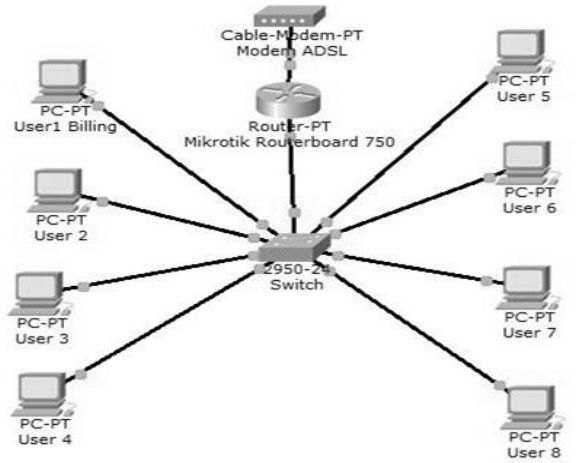

Figure 4. The design after using Mikrotik

Whereas in Figure 4, namely the design of a computer network after using Mikrotik, it can be seen that between the modem and switch devices, there is a proxy router that functions to regulate internet connections and manage bandwidth. In other words, the modem is not directly connected to the switch/hub on the user's computer but must go through the proxy router. This is because the internet connection settings and bandwidth settings for several user computers must go through the setting agreement made on the proxy router.

RESULTS AND DISCUSSION

In this study, Winbox tools were used as a data test that had been analyzed to find out the causes of the problem and find the right solution to solve the problem. The first step to be taken in this study is to conduct field observations. Based on field observations through direct observation, the results show that upload and download speeds are not good. This is because bandwidth management is not yet optimal, so bandwidth management is needed at Aminet cafes. On average, users at Aminet cafes use computers to play online games, many users experience problems every day, while the managers of Aminet cafes are not tech savvy. Bandwidth Speed Testing before and after using a proxy in this study uses the http://speedtest.cbn.net.id/ site by displaying download and upload speed results.

Table 1. User Bandwidth Management Testing Before using the proxy and Queue Tree

	Aktivitas (Kbps)	
User	Upload	Download
User1	497	1167
User2	397	1014
User3	221	945
User4	502	2057
User5	397	1765
User6	477	1694
User7	447	2108
User8	419	1967

In table 1 it can be seen that the User Bandwidth Management Test before using the proxy. Where the most dominant upload speed is user 4 while the download speed is user 7.

Table 2. User Bandwidth Management Tests after using the proxy and Queue Tree

	Aktivitas (Kbps)	
User	Upload	Download
User1	121	720
User1	120	735
User1	120	739
User1	121	725
User1	126	745
User1	122	735
User1	120	727
User1	124	732

In table 2 it can be seen the User Bandwidth Management Test after using the proxy and Queue Tree. Where the average upload speed is 121 kbps while the average download speed is 732kbps. It can be seen that there is no dominant upload and download speed so that every internet cafe user remains optimal in using the computer.

A. Testing Results of Limit Extension Mikrotik

In the settings made on Mikrotik, a test was also carried out to see whether the settings made worked properly or not, but the settings for all limit extensions were the same as made on Mikrotik, therefore the limit extension test on Mikrotik was only taken 1 sample, representing all limit settings extension used, and at this stage, the test is carried out on the ".mp3" extension.

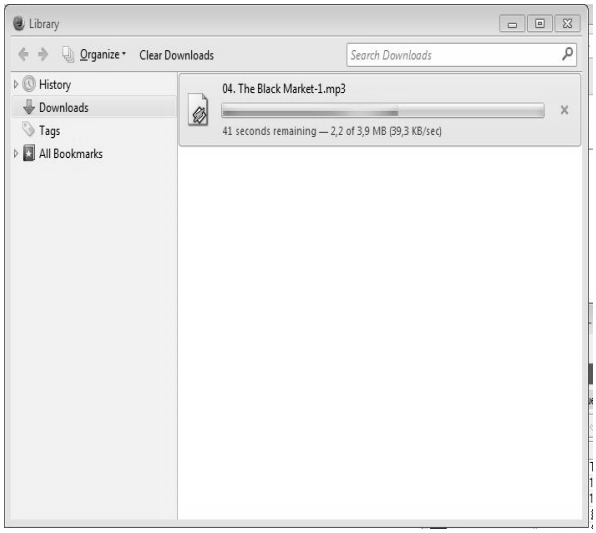

Figure 5. Queue Tree Limit Extension Test Results

In Figure 5 it can be seen the results of testing using the Queue Tree Limit Extension, the result is that the file being downloaded is at a speed of 39.9 KB or 319.2 kbps, so it is still within the range of bandwidth usage, namely 512k.

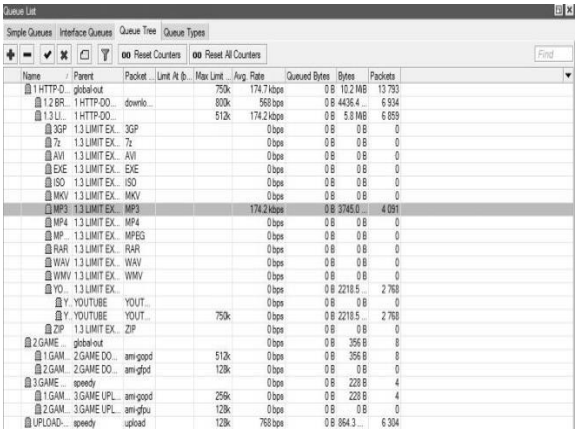

Figure 6. View of the Queue Tree

In Figure 6. The results of the Queue Tree Limit Extension Test can be seen at the average rate of 174.2 kbps by testing the type of file downloaded, namely ".mp3" when the bandwidth usage to download the extension is still within the range applied, namely 512k/ 512 kbps .

B. Testing Queue Tree Online Game Results

The test was carried out with several computers playing online games, therefore the results displayed from the online game queue list are almost close to the bandwidth limit, the results can be seen in Figure 7.

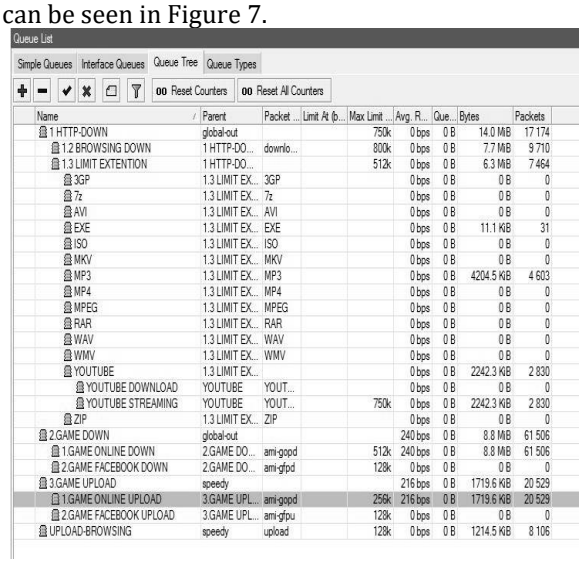

Figure 7. Online Game Queue Tree Results

In Figure 7 you can see the test of 1.GAME ONLINE DOWN (online game download) bandwidth speed of 240k/240kbps, where the test results in a given max limit of 512k/512kbps and speed 1.GAME ONLINE UPLOAD also gets a bandwidth speed of 216k/216kbps where the speed is also almost at the max bandwidth limit of 256k/256kbps.

Table 3 results of comparison before and after bandwidth management is carried out

	Before		After	
User	Upload	Download	121	720
User1	497	1167	120	735
User2	397	1014	120	739
User3	221	945	121	725
User4	502	2057	126	745
User5	397	1765	122	735
User6	477	1694	120	727
User7	447	2108	124	732
User8	419	1967	124	732

Based on the table 3, it can be seen that the test before and after bandwidth management is carried out using a proxy and Queue Tree. In the previous column, it can be seen that the speed of each user is not the same where the highest upload speed is on user 4 while the highest download speed is on user 7. These results are very different after bandwidth management is carried out using a proxy and Queue Tree where each user has the same speed so there is no who have trouble using the computer

CONCLUSION

Based on the results of the analysis during testing at the Aminet cafe using a proxy router with Queue Tree, the upload and download speeds are balanced for each user because the bandwidth distribution process has been carried out. The difference in bandwidth usage after using the Mikrotik router in the download process is 281 kbps, this is because the bandwidth has been divided within the router so that it does not produce a significant difference, such as the download process before using the Mikrotik router, which is 1163 kbps. Meanwhile, the difference in bandwidth usage in the upload process is only 6 kbps, where previously using a proxy router the difference in the upload speed process was 281 kbps.

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