



Implementation of Hotspot Server and Bandwidth Management Using PCQ on Mikrotik

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ABSTRACT

Keywords
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Management
Mikrotik
PCQ

Lajau Kopi is a cafe located in Batu Aji, Batam, and utilizes the internet with a total bandwidth of 20 Mbps. The high access of users who use the internet, the connection becomes unstable, sometimes fast or sometimes slow and the number of users who use the downloader application results in decreased performance of the internet network, the purpose of this research is to optimize bandwidth so that the available bandwidth can be used evenly and apply the PCQ method. as one of the bandwidth management methods used. For this reason, it is necessary to build a bandwidth management method that uses a proxy routerboard with the PCQ (Per Connection Queue) method. The PCQ method is one of the methods on the proxy router that is quite reliable in bandwidth management, which is to divide bandwidth fairly and evenly. The analysis is implemented by configuring the mikrotik router and conducting direct testing assisted using speedtest.cbn.net.id and tools on winbox, namely torch. From the test results obtained in the PCQ method at Lajau Kopi, it is quite good and each computer gets bandwidth fairly and evenly. With the bandwidth owned by Lajau Kopi, which is 20 Mbps, which means $1 \text{ Mbps} = 1024 \text{ Kbps} * 20 = 20480 \text{ Kbps}$ which will be divided automatically if all 4 users are using it, this bandwidth management will be carried out evenly, which is 10 Mbps for each download. users. As for uploading 1 Mbps for each user.

1. Introduction

WLAN/WIFI network is very helpful for many people in terms of usage. Many places - public places that provide free wifi network as part of their services. To use wifi a hotspot is required. Hotspot is a description of the scope that can be reached by the frequency of the WLAN/WI-FI network at a point. Then users can access the WI-FI network using devices that support the user's WI-FI technology [1].

Hotspot packages are used to perform authentication, authorization and accounting for users who access the network through the hotspot gateway. Hotspot users before accessing the network need to authenticate via a web browser, both with the http and https (secure http) protocols [2]. Hotspots generally use the IEEE 802.11b or 802.11g WLAN standard and are capable of providing access speeds of up to 11 mbps (IEEE 802.11b) and 54 mbps (IEEE 802.11g) [3].

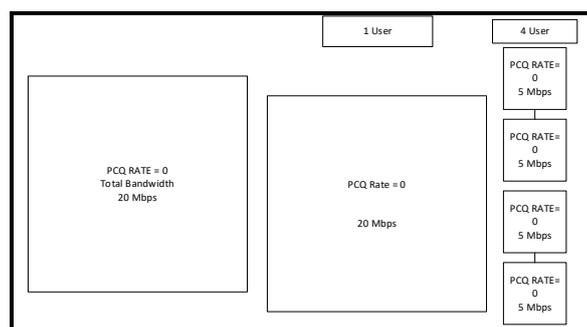


Fig 1. Bandwidth sharing scheme



Lajau Kopi is a cafe that works with the Ngikan shop in the same building so that it has a large number of customers, especially on weekends which can reach more than 100 people, the number of their customers so that they have problems with their wifi service because they do not have good bandwidth management. Bandwidth sharing can be done using a proxy. There are many methods that can be used to share bandwidth on MikroTik. PCQ (Peer Connection Queue) is a method that exists in MikroTik. PCQ is a very simple but very effective method for use in public places that does not require a classifier in the distribution of bandwidth [4][5]. With the distribution of bandwidth evenly will increase the stability in the use of the wifi network. With a distribution scheme of 1 user 20 Mbps, 2 users will get 10 Mbps each and if the number of devices continues to increase, it will be automatically divided evenly.

2. Method

2.1 Research Design

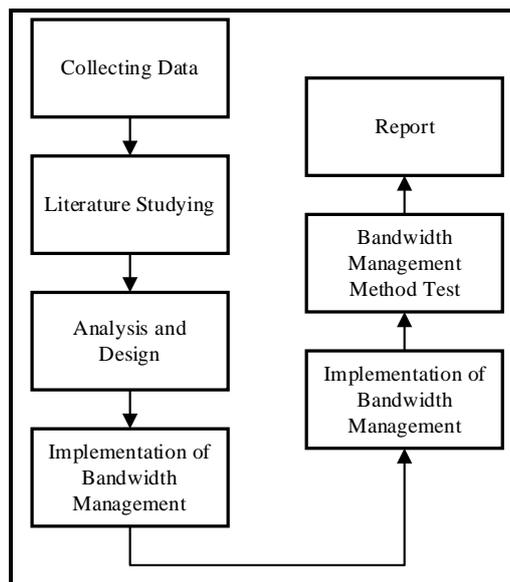


Fig 2. Research Design

The role of research design is very important in solving research problems. research design is the process of planning and implementation as well as the stages carried out in research. The research design was carried out in several stages including:[6].

2.2 Data Collection

At the data collection stage the author makes an appointment to the cafe manager to look directly at the object of research by making observations to get information or information from the object of research. As well as interviews with Mr. Gani as the operational manager at Lajau Kopi and the person in charge of the research site by asking questions that are the focus of the research.[7].

1. Observation

The process of finding the information needed by direct observation. The author's direct observation or observation is done by coming to Lajau Cafe to get information that is the focus of research.

2. Interview

The author conducted an interview with Mr. Gani as an operations manager by asking several oral and written questions to obtain more complete information data.

3. Studying literature

The next stage is to determine and study the literature or scientific sources that are the focus of this research. The author looks for sources from scientific journals that discuss.

About bandwidth management, hotspot authentication, PCQ method and other theories that support this research including books and journals.





2.3 Analysis and Design

In the analysis and design, the researchers applied research to the Lajau Café located in Batu Aji, Batam. The application of a hotspot server and bandwidth management with the PCQ method is a necessity to reduce network problems in cafes [8].

That because previously there was no method of sharing network bandwidth at the café, causing the hotspot network to become unstable as a result of bandwidth tugging that was not managed properly. The design process is carried out using Microsoft Visio to describe the current and proposed topology.

2.4 Implementation of Bandwidth Management

Implementation is carried out directly at the café where the author conducts research. By installing a mikrotik routerboard and configuring the devices installed on the café lajau network system. By building a hotspot network using a mikrotik routerboard and managing bandwidth using the PCQ (Peer Connection Queue) method. The stages of implementing the PCQ method in Mikrotik [9].

1. Click Menu Queue>Queue Type>Add(+);
2. Fill in Type Name=PCQ Download, Kind=Pcq ,Rate=0,Classifier=Dst.Address;
3. Then click Apply and OK;
4. Click Menu Queue>Queue Type>Add(+);
5. Fill in Type Name=PCQ Upload ,Kind=Pcq ,Rate=0,Classifier=Src.Address;
6. Then click Apply and OK;
7. Select Menu Queue>Simple Queue>Add(+);
8. Fill in Name= PCQ 1 (Free),Target=0.0.0.0/24 (Network Client);
9. Click Advanced > Fill Queue Type;
- 10.Target Upload=PCQ Upload, Target Download=PCQ Download;
- 11.Click Apply and OK.

2.5 Bandwidth Management Method Test

In this process, the author conducted a test on the hotspot server research and bandwidth management whether it was in accordance with the objectives of the researcher and in accordance with the research discussion[10].

2.6 Report Preparation

For the preparation of the author's report, it is done by collecting data, information and research results. As well as the preparation of the report using the systematic preparation that has been set, so that the report is well structured.

3. Results and Discussion

3.1 Hotspot Network Configuration

1. Setting Interfaces Name

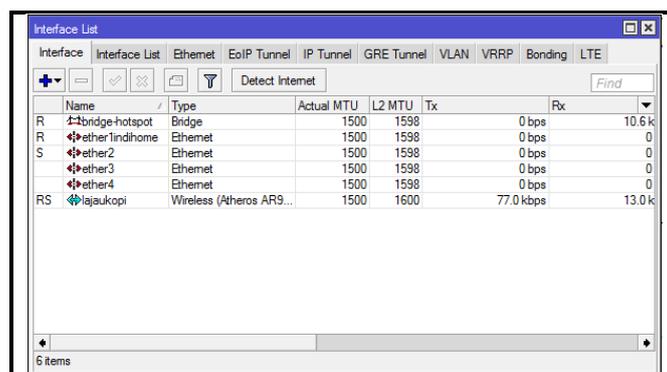


Fig 3. Interface's Name

Log in to the proxy and configure it in the proxy.



2. Setting IP Address

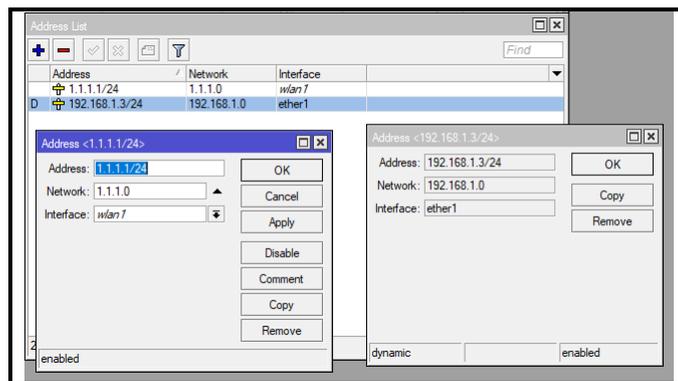


Fig 4. Setting IP Address

- a. Ether 1 IP Indihome : 192.168.1.3/24
- b. WLAN 1 local : 1.1.1.1/24

3. Setting IP Gateway

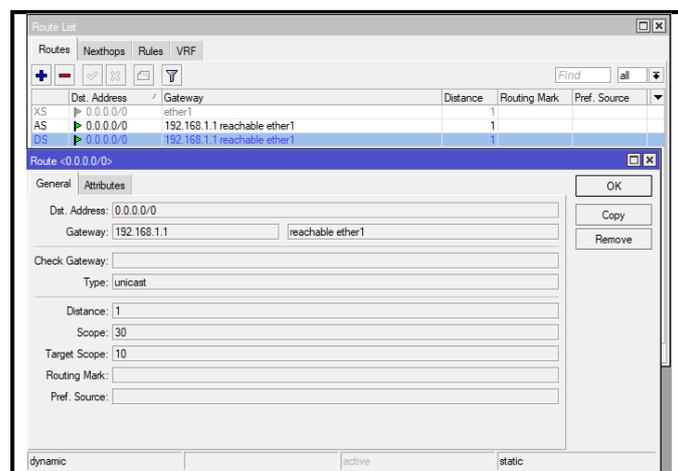


Fig 5. Setting IP Gateway

Input the IP modem indihome, the IP that the researcher uses is 192.168.1.1 in the Gateway column.

4. Setting IP DNS

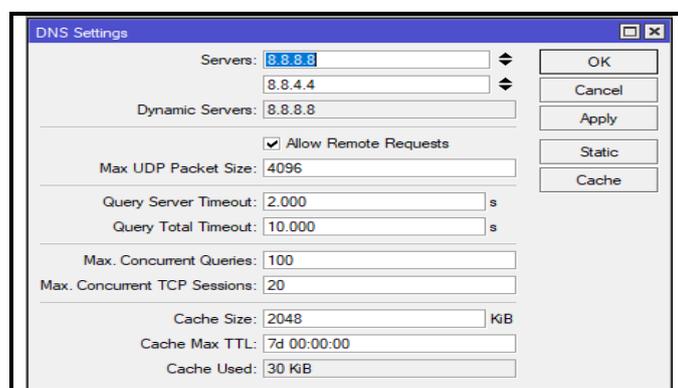


Fig 6. Setting IP DNS

Here the researcher uses Google DNS.

- a. Preferred DNS : 8.8.8.8
- b. Alternative DNS : 8.8.4.4





5. Setting Network Address Translate(NAT)

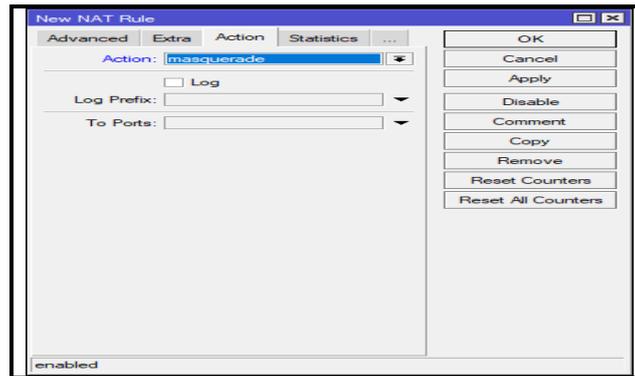


Fig 7. Setting (NAT)

NAT settings on winbox are on the IP menu - Firewall - NAT - then click the "+" sign. Then on the Chain menu select scrnat then click the Action tab and select masquerade and then click ok.

6. Setting Bridge Port

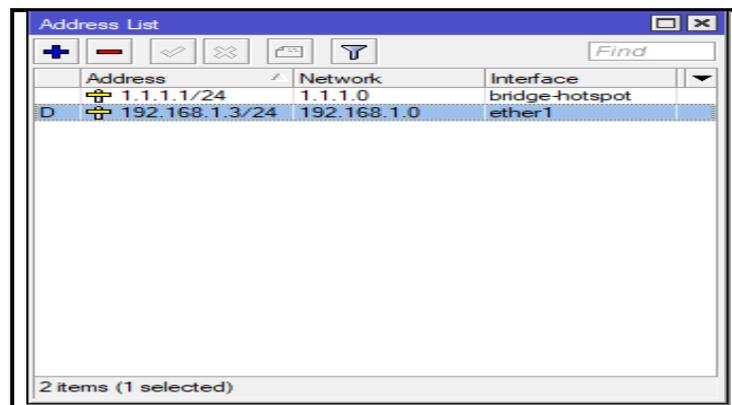


Fig 8. Setting Bridge Hotspot

Bridge port is done to insert 2 interfaces into the bridge interface so that the two interfaces have the same 1 IP segment. Where WLAN1 interfaces are used for user access on the 1st floor and port 2 is used for user access on the 2nd floor by using the access point as user access.

7. Setting Hotspot Autentikasi



Fig 9. Hotspot Authentication's Result

Authentication hotspot login can provide security for authorized users to connect to WLAN networks. In making a hotspot on the Mikrotik Router, that is by clicking the IP menu – Hotspot – then selecting the menu – Hotspot Setup – Select the interface for the hotspot – Follow the steps to completion such as making DNS for hotspots.

8. Manajement Bandwidth

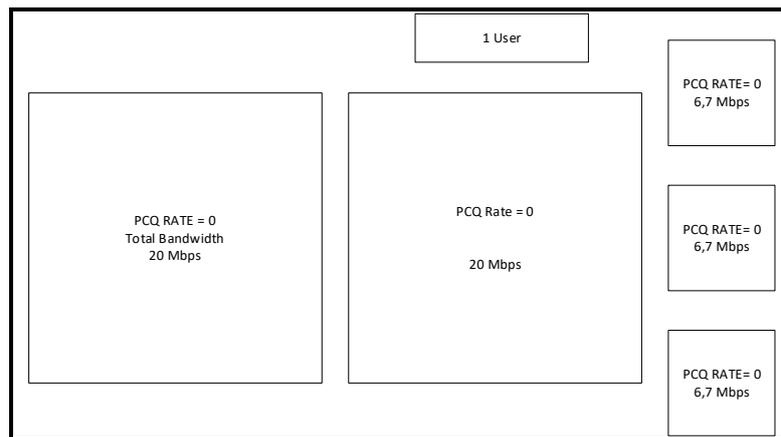


Fig 10. Manajement bandwidth with PCQ Method

At this stage the researcher will discuss the implementation of bandwidth management at Lajau Cafe. With the bandwidth owned by Lajau Cafe as much as 20 Mbps which means 1 Mbps = 1024 Kbps * 20 = 20480 Kbps which will be divided automatically to users according to the number of active users.

9. Create Queues Type

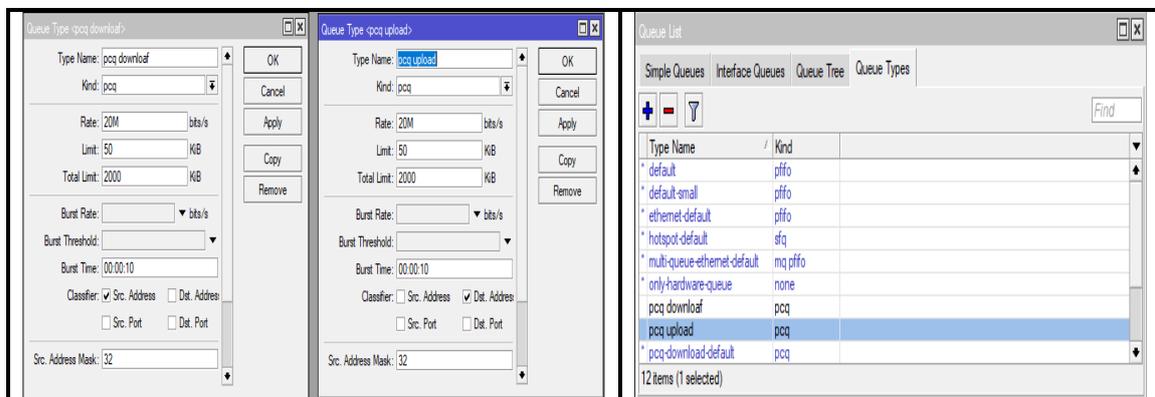


Fig 11. Queues Type On Mikrotik And Result Queue Type

Create a queue type PCQ for uploads and downloads. Queues - Queue Types - click the "+" sign then in the classifier option select dst address for PCQ download and src address for PCQ upload.

10. Application of bandwidth limitation

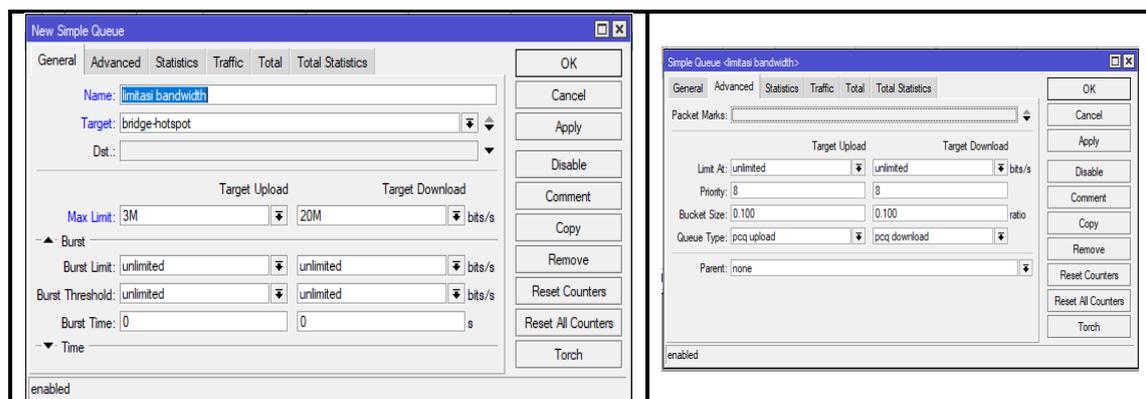


Fig 12. Application of Bandwidth Limitation And Determination Queue Type



11. Testing the results of bandwidth sharing using PCQ

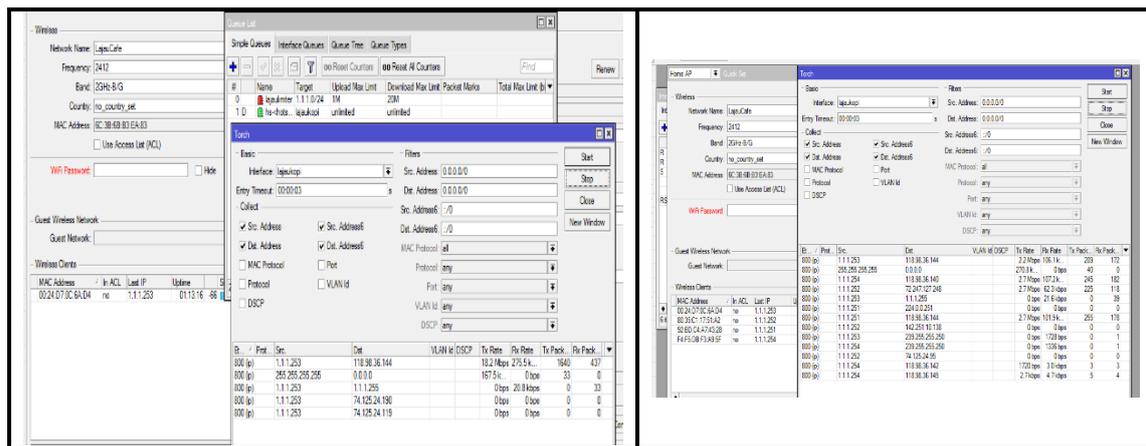


Fig 13. 1st and 2nd Test

In PCQ limit, max limit and priority can be set to manage bandwidth well. Here the researcher tries to use 4 user or client devices as an experiment testing the PCQ method in Lajau Kopi using monitoring tools in Winbox, namely Torch.

In testing 1 user the maximum bandwidth that can be obtained is 18.2Mbps, then followed by 2 users. Then proceed with testing using 2 users, from the results obtained, the total bandwidth is evenly distributed.

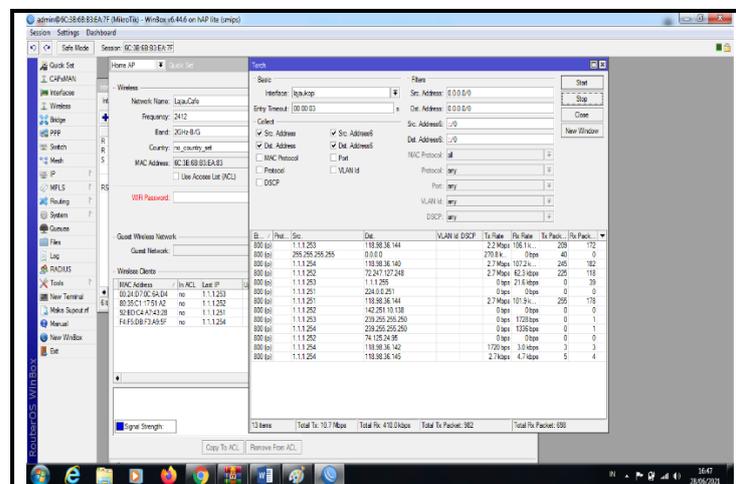


Fig 14. 3rd Test

From Fig.14., the bandwidth obtained by the 4 PCs or clients is obtained.

1. Client 1 (1.1.1.1/25)
2. Client 2 (1.1.1.1/26)
3. Client 3 (1.1.1.1/27)
4. Client 4 (1.1.1.1/28)

So the results of this third test, the bandwidth used by 4 PCs is divided fairly and evenly. The following is a table of PCQ test results:

Table 1. Test on 1 PC

		1 PC User		Max Limit (bit/s)		Bandwidth Monitor's Result
Computer/IP	Parent	PCQ rate	Upload	Download		
Client 1 1.1.1.1/25	Ether1-indihome	Wlan-local	0	3 Mbps	20 Mbps	18,3 Mbps





Table 2. Test on 2 PC(s)

Computer/IP	Parent	2 PC User				Bandwidth Monitor's Result
		PCQ rate	Max Limit (bit/s)			
			Upload	Download		
Client 1 1.1.1.251	Ether2- indihome	Wlan-local	0	3 Mbps	20 Mbps	8,0 Mbps
Client 2 1.1.1.252						8,3 Mbps

Table 3. Test on 4 PC(s)

Computer/IP	Parent	4 PC User				Bandwidth Monitor's Result
		PCQ rate	Max Limit (bit/s)			
			Upload	Download		
Client 1 1.1.1.251	Ether2- indihome	Wlan-local	0	3 Mbps	20 Mbps	2,4 Mbps
Client 2 1.1.1.252						2,7 Mbps
Client 3 1.1.1.253						2,7 Mbps
Client 4 1.1.1.254						2,7 Mbps

12. Discussion

After implementing the research on the quality analysis of the Mikrotik router on the Wifi network, the next researcher will discuss all the problem formulations that are the reference material in this study as follows:

a. Implementation of a new network with mikrotik in Lajau Kopi.

Based on the results of the new network analysis using Mikrotik using the Per Connection Queue method and experiencing additional hardware such as Mikrotik using additional software Mikrotik RouterOS and Winbox.

It can be seen from figure 3. is a new network topology for Lajau Kopi with the addition of Mikrotik. At this stage is the process of installing a new network starting from the addition of hardware and the installation process of supporting software for the use of Mikrotik. It can be seen from step by step and the results of the connection tests are categorized as good to be ready for use. So it can be concluded that the implementation of the new network using Mikrotik on Lajau Kopi is good based on the test data.

b. Optimizing bandwidth for each user in Lajau Kopi.

Based on the results of the first, second and third test, the bandwidth usage by each user has a fairly good average value. The results of the data measured and analyzed are PCQ parameters, namely Bandwidth, Classifier, Rate, Limit and Total Limit using tools such as Winbox, Torch, and Speedtest.cbn.net.id against the first, second and third tests with values PCQ rate 0.

From the value of the results of the first test using 1 user, it is categorized as good for the download speed which has a bandwidth usage value of 18.3 Mbps. For the second test using 2 users, it is categorized as good for download speed with a bandwidth usage value of client 1 of 8,0 Mbps and client 2 of 8,3 Mbps. In the third test using 4 users, it can be categorized as good for download speed which has a client 1 bandwidth usage value of 2,4 Mbps, client 2 of 2,7 Mbps, client 3 of 2,7 Mbps and client 4 of 2,7 Mbps.

Judging from the first, second and third tests the bandwidth value category received by each user is quite good. So it can be concluded that the bandwidth usage by each user in Lajau Kopi is good based on the test data.





4. Conclusion

This research was conducted with the aim of obtaining empirical evidence regarding the PCQ method in Lajau Kopi. This study makes several conclusions based on the results of the research and discussion that have been described previously, as explained as follows:

- a. Implementation of a new network using Mikrotik on Lajau Kopi is very suitable and effective to use to add services for consumers who need the internet;
- b. Bandwidth optimization in Lajau Kopi using the PCQ method is influenced by parameters such as Classifier, Rate, Limit and Total Limit;
- c. The application of the PCQ method to Lajau Kopi is very suitable for the topology of the company;
- d. Mikrotik rb941 2-nd routerboard which already contains Mikrotik RouterOS can be used as a reliable router for bandwidth sharing regardless of the price and its minimalist shap.

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