

Bandwidth Analysis Using Simple Queue Method at Communication and Informatics Department of Palembang City

Frendi Aquaris¹, Misinem^{2*}

^{1,2}Computer Engineering, Vocational Faculty, Bina Darma University

***Email:** misinem@binadarma.ac.id

Abstract

The goal of this research is to execute bandwidth analysis and management so that the bandwidth obtained by each client is distributed evenly at the Department of Information and Communication in Palembang City. This department serves as a computer network linked to an ISP (Internet Service Provider). The issue at the Palembang City Communication and Information Office is the lack of bandwidth control, which causes the internet access speed to fluctuate. As a result, bandwidth management with Mikrotik is required; the bandwidth distribution method is the basic queue method. You may control bandwidth utilization and split bandwidth evenly by implementing bandwidth management utilizing the simple queue approach, and your internet access speed will become consistent.

Keywords

Bandwidth, Simple Queue, Mikrotik, Internet Service Provider (ISP)

Introduction

Along with the rapid development of information technology, it has significantly contributed to the development of computer network management as a data communication medium that affects internet access speed. This internet speed must be appropriately managed so that there are no problems, such as prolonged data transmission or an unstable internet connection, both in uploading and downloading, affecting work productivity (Chetty et al., 2013).

Upload and download speed are two critical things to expedite data transmission. Many things can affect the speed of the two processes, including the amount of bandwidth used by the network and how effectively this bandwidth can be utilized. Bandwidth is a calculation of available data consumption in a telecommunication (Javaid et al., 2023). They are calculated in units of bits per second/bps. With so many clients using computers to access the internet, the internet access speed becomes unstable so it can interfere with performance. To overcome the bandwidth problem, bandwidth management uses the simple queue method to improve bandwidth distribution.

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Methodology

The processes involved in this research's technique are as follows: first, define the computer network, bandwidth, and quality of service; next, put the simple queue and tools such as Mikrotik, and winbox into practice. Subsequently, the descriptive analysis is intended to produce methodical, factual, and precise illustrations or sketches of the facts pertaining to the events. The following is an explanation of this strategy.

Computer network

Computer networks are an unavoidable necessity, and in general, a computer network is a group or group of several interconnected computers using communication protocols and communication media to share information, applications, and hardware (Sugiyono, 2016). Furthermore, computer networks are a collection of multiple communication terminals located in various locations, each with more than one interconnected computer (Kurniati & Dasmien, 2019).

Bandwidth

Bandwidth is a calculation of available data consumption in a telecommunication. Calculated in units of bits per second/bps, Bandwidth is the value of data transfer consumption calculated in bits/second or commonly called bits per second (bps), between the server and client within a specific time, or what is meant by bandwidth is the area or range of frequencies used by signals in the transmission medium. So, you can Lock bandwidth, which is the maximum capacity of the communication line to transfer data in seconds. The function of bandwidth is to calculate data transactions (Shah & Farhana, 2009).

Bandwidth Management

Bandwidth Management is a tool that can manage and optimize various types of networks by implementing Quality of Service (QOS) services to determine the types of network traffic. At the same time, QOS is the ability to describe achievement in a data communication system. The bandwidth regulation mechanism aims to prevent a monopoly on bandwidth usage so that all clients can get their bandwidth quota (Setiawan & Maulana, 2018).

Simple Queue

The simple queue method is a bandwidth-sharing feature on the Mikrotik router board, which is accessible in terms of configuration. For its use, simple queues are usually used for small and medium networks because the bandwidth distribution is per user. The simple row is one of the limiter systems found on Mikrotik routerOS and is the easiest way to limit the data rate of a predetermined or recognised IP address or subnet; the advantage of a simple queue is that it can restrict speed and peer-to-peer connections, can limit traffic on the IDM (Internet Download Manager) application and can limit fixes (low leakage rate). Configuring the simple queue method for bandwidth management requires Mikrotik router-board hardware and Winbox software. Winbox is a software that is used to make it easier for users to enter and configure Mikrotik router-board devices both in CLI (Command Line Interface) mode and in GUI (Graphical User Interface) mode (Novrianda, 2018).

Mikrotik

Mikrotik is an operating system that includes software installed on a computer to allow it to operate as the network's heart, controlling or regulating data traffic between networks; this sort of computer is known as a router. So, in essence, Mikrotik is a router operating system; Mikrotik is known as a stable routerOS with many capabilities to support a seamless network. Network routers provide a variety of characteristics designed for IP and wireless networks, making them ideal for ISPs (Internet Service Providers), Hostpot Providers, and Internet cafes (Ayuningtyas et al., 2018).

Winbox

Winbox is a utility used to access a proxy server in GUI mode remotely. If configuring the proxy in text mode via the PC itself, then for the GUI mode using Winbox, configure the proxy via a client computer (Abdul Muis et al., 2010.).

The method used in this research is using descriptive method. The illustrative way examines a group, a person, an object, a situation, and thought, or an event in the present. This descriptive research aims to make systematic, factual, and accurate pictures or drawings of events-related facts (Siedlecki, 2020).

Based on the description of this research method, from the results of network diagnostics at the Communications and Informatics Office of the City of Palembang, there is a problem where internet access speeds often experience a decrease in rate, both in the upload and download process. It occurs because many clients access the internet during these hours, which disrupts employees' work. Therefore, the author intends to manage bandwidth using the Simple Queue Method to overcome these problems (Ali et al., 2016). As for the stages in performing the configuration, a flowchart image can be made as follows:

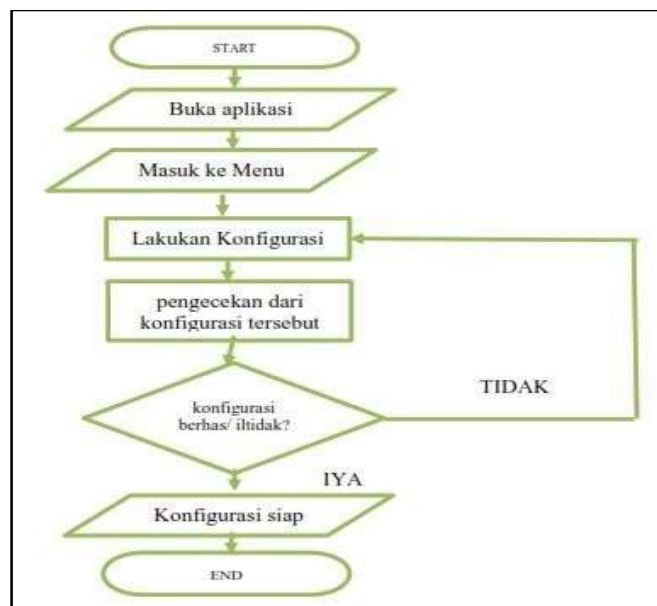


Figure 1. Simple Queue Configuration Flowchart

Results and Discussion

Results

At this stage, the researcher conducted a configuration trial by simulating bandwidth management using the simple queue method on the practicum tool itself; this was done so as not to disturb the work process at the Palembang City Communication and Informatics Service; this research will focus on bandwidth management for seven (7) IP addresses because the seven (7) rooms to be simulated have seven (7) different IP addresses. The download access speed reaches 25.82 Mbps, and the upload reaches 9.67 Mbps; each room will get an internet quota of 2 Mbps, as for the results obtained from testing bandwidth management using the Simple Queue method, namely internal access speed before bandwidth management is carried out and internet speed after bandwidth management is carried out.

The following are the results of the research conducted, namely testing the simulated bandwidth before sharing it using Speedtest, the results of the bandwidth management configuration with Simple Queue and the results of the Throughput test received by each client (room) consisting of 7 rooms:



Figure 2. Before Bandwidth Management

Following are the results of throughput results in each room using Speedtest:

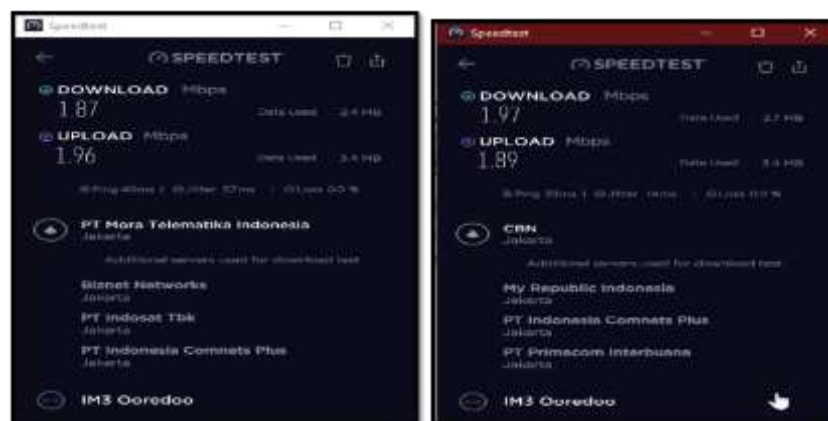


Figure 3. Throughput Management Test Results for Rooms 1 and 2

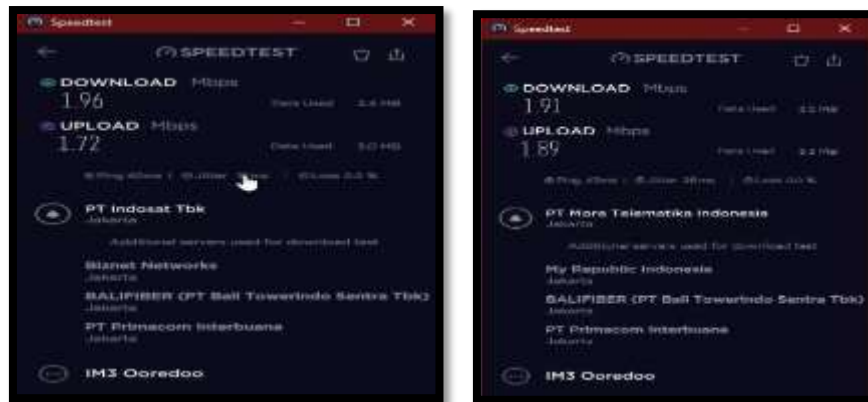


Figure 4. Throughput Management Test Results for Rooms 3 and 4

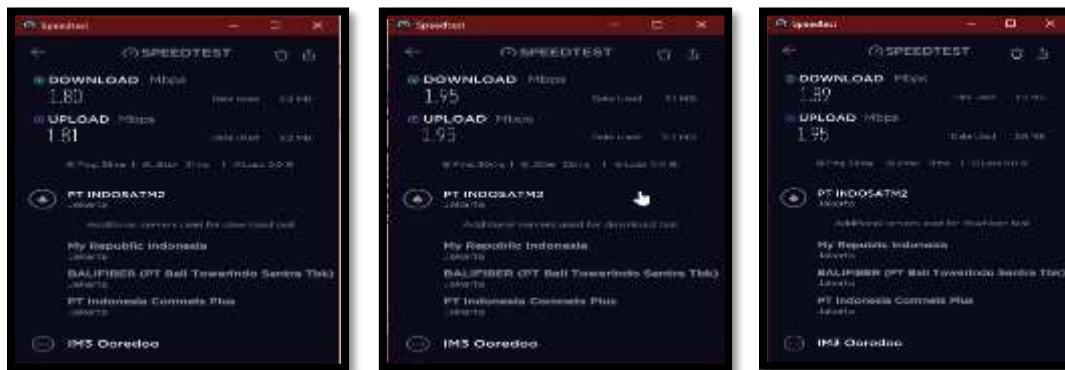


Figure 5. Throughput Management Test Results for Rooms 5, 6 and 7

Discussion

The following are the stages of the results of research conducted by bandwidth management using the Simple Queue method as follows:

Winbox Configuration

Configure the IP address in room 1 by selecting the IP menu, then selecting the address, then entering the IP address in room 1, namely 192.168.10.1/24 on Ether 1. Wlan1: (address=192.168.90.1/24) (Network=192.168.90.0) WLAN 1 functions as an internet line that is connected to a cellphone hotspot connection as a place for internet access. Also, do the configuration in rooms 2,3,4,5,6 and 7 with the predetermined IP.



Figure 6. IP address configuration in rooms 1,2 and 3

In Figure 6, enter the IP Address of rooms 1,2 and 3 in ether 2, the IP Address of room 1 = 192.168.10.1/24. IP address room 2=192.168.20.1/24. IP address room3 = 192.168.30.1/24. For wlan1, also enter the IP address; the IP Address for wlan1 is 192.168.90.1/24—wlan1 functions as an Internet network.

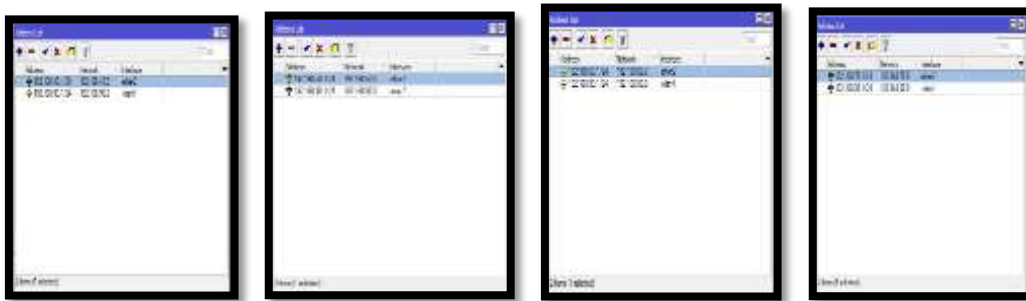


Figure 7. IP Address Configuration in Rooms 4,5,6 and 7

In Figure 7, enter the IP Addresses of rooms 4,5,6 and 7 in ether 2, the IP Address of room 4 = 192.168.40.1/24. IP address room 5=192.168.50.1/24. Room 6 IP address = 192.168.60.1/24. IP address 7=192.168.70.1/24 For wlan1, also enter the IP address. The IP Address of wlan1 is 192.168.90.1/24, wlan1 functions as an Internet network.

Then, configure NAT (Network Address Translation), which changes the IP Address for each data packet from the user's computer (Private IP Address) to the Public IP Address on ether1. In NAT, masquerade automatically replaces the Private IP Address with the Public IP Address. To configure, select the IP menu, then select Firewall, and then the setting becomes masquerade on ether1 as shown in figure 8 below:



Figure 8. NAT Configuration

On the general menu, there is a chain select srcnat. Srcnat functions to change the source address of a data packet, meaning that when accessing a website from a LAN network, according to the rules, local IP addresses are not allowed to enter WAN networks, so srcnat is needed to hide the local IP address and replace it with a public IP address installed on the router, then for the Action Menu select masquerade. Masquerade functions as a translation or change from Private IP to Public IP to connect more computers and one network.

Configure Simple Queues

The next thing to do is bandwidth management. The first time is configuring the total bandwidth in the seven (7) rooms. This unlimited bandwidth will later function as the parent or parent of the client in each of these rooms. Configure by clicking on the Queues menu, selecting Simple Queues, and then clicking the “+” sign. Then enter the general menu then enter the IP address in each room. Then, enter the max upload and download limit of 2 MB. The maximum limit is the full bandwidth allocation a client can obtain if other clients no longer use it. The configuration is shown in Figure 9 below:



Figure 9. Simple Queue Total Bandwidth Configuration in Room 1

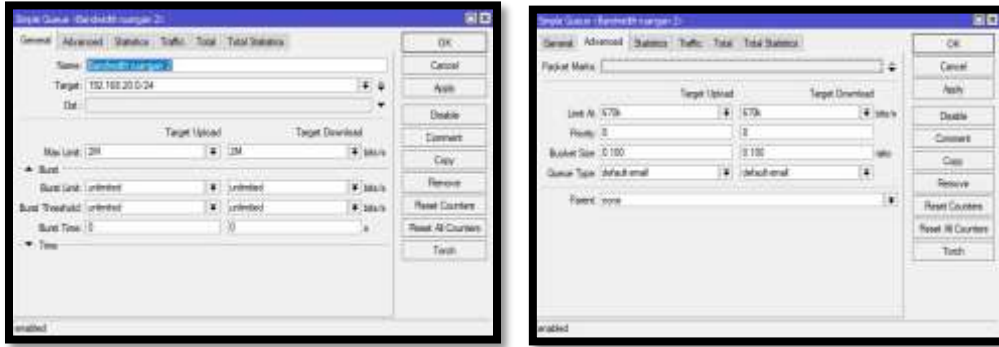


Figure 10. Simple Queue Total Bandwidth Configuration in Room 2

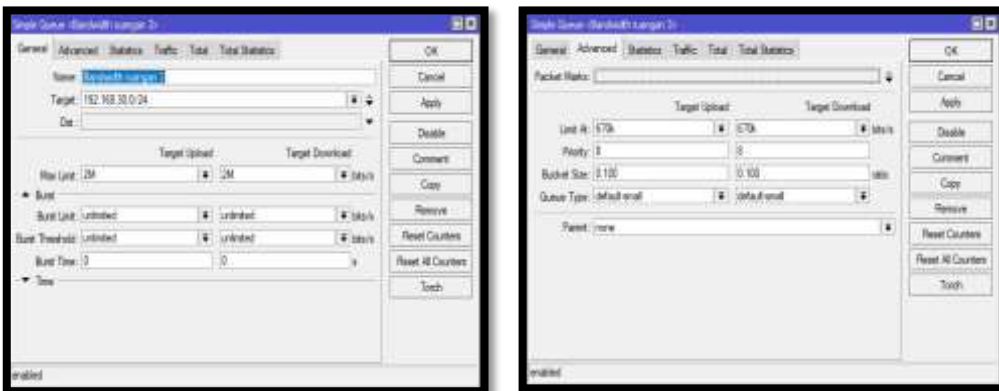


Figure 11. Simple Queue Total Bandwidth Configuration in Room 3

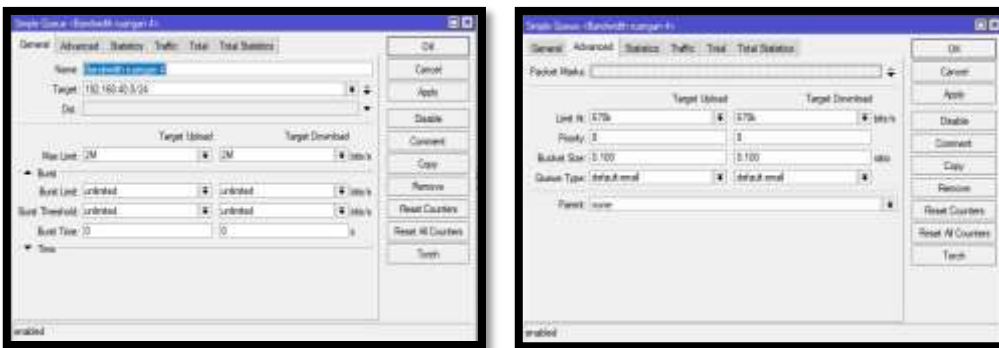


Figure 12. Simple Queue Total Bandwidth Configuration in Room 4

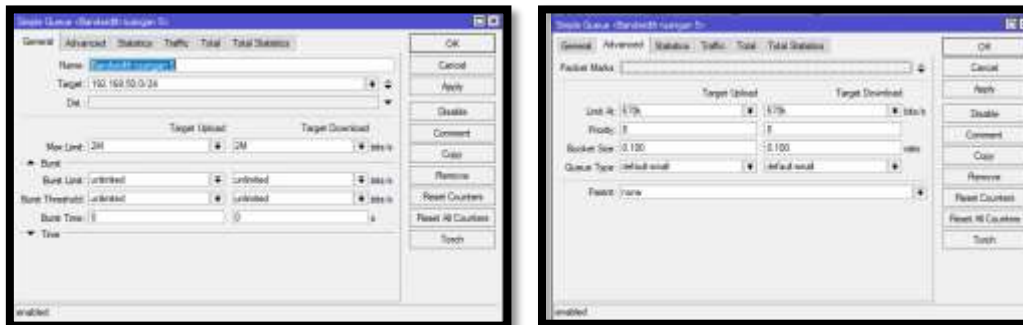


Figure 13. Simple Queue Total Bandwidth Configuration in Room 5

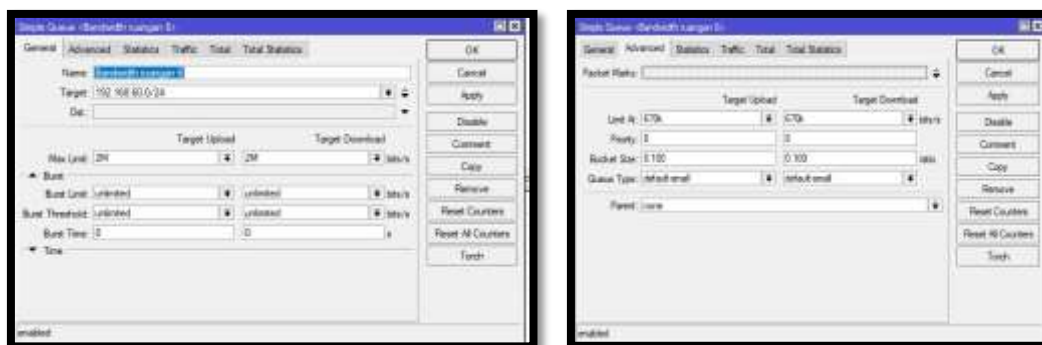


Figure 14. Simple Queue Total Bandwidth Configuration in Room 6

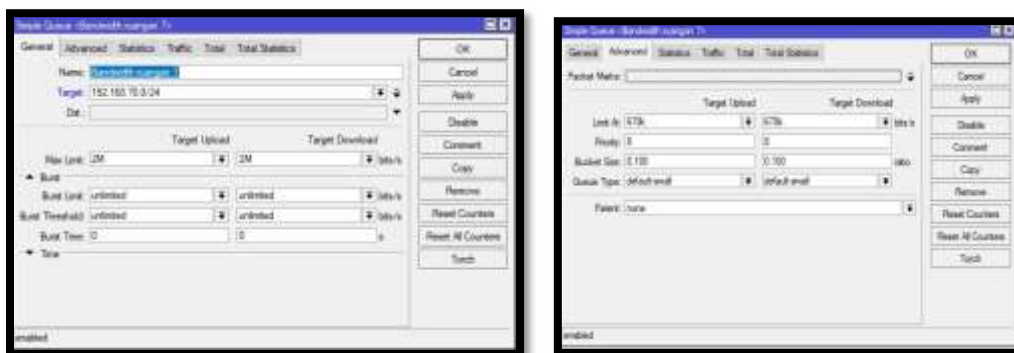


Figure 15. Simple Queue total bandwidth configuration in room 7

Conclusion

With the Bandwidth analysis and management system using the Simple Queue method, each client computer can get bandwidth evenly and fairly according to the desired distribution, and bandwidth management using the RB951UI-2Hnd proxy is easier because there are applications to manage as well as for remote clients, namely using the Winbox application and in the simple Queue method that is applied to the RB951UI-2Hnd proxy it can solve problems that occur in the distribution of uploads and downloads to access the required internet.

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