



Penerapan Metode Simple Queue Pada Manajemen Bandwith Berbasis Mikrotik

Donal Tamba^a, Yulvia Nora Marlim^b

^aDepartment of Computer Science, Institut Bisnis dan Teknologi Pelita Indonesia, Pekanbaru, Indonesia

Article History

Received

15 Mei 2025

Received in revised form

8 June 2025

Accepted

15 June 2025

Published Online

31 June 2025

*Corresponding author

yulvia.nora@lecturer.pelitaindonesia

Please provide an **official organization**

email of the corresponding author

Abstract

In line with the development of information technology, computer network support equipment is still very much needed. Equipment has also become an important component in the development of computer networks. The internet is a connection between several or many computers and networks with different operating systems and applications by utilizing advances in communication technology that use the TCP/IP protocol. The internet can be interpreted as a collection of several computers or millions of computers around the world that are connected to each other through the media of fiber-optic cables, satellites or via telephone connections. The use of the internet is currently an important requirement in all fields and one of them is in the field of education such as in schools. The use of the internet in the school environment is not only done by teachers and employees, but also by students. The internet is used for surfing for information, looking for other learning resources, or for information systems in schools. The internet provides various functions and facilities that can be used as a sophisticated medium of information and communication. Technological developments that can be utilized from this internet connection are being able to access electronic equipment such as room lights that can be operated online via a website or mobile. Network use often has problems when logging in to the internet, for this reason it is necessary to have adequate internet network management with a stable network connection. And internet bandwidth management is needed so that it can be shared on average among users or internet users and to improve security to make it easier to monitor its use. System development uses the Network Development Life Cycle method. The hotspot information system application is tested, with the admin being able to set the number of users, bandwidth, time limit, the user makes a hotspot request and is then approved by the admin, so that the admin gets the settings from the hotspot settings, the user can log in to the hotspot after getting the hotspot approval from the admin. This application can make it easier for schools to manage networks.

Keywords: *Hotspot, Network Development Life Cycle, Mikrotik*

1.0 INTRODUCTION

Today, technology has developed rapidly and become sophisticated. Humans use technology in their daily activities, making it a necessity. In fact, by using technology, humans can create many things. Keeping up with the times, technology has become widespread and rapid. The presence of technology is very helpful and simplifies work, which can be done anywhere. One example is the sophistication of computers. By utilizing computer technology, we can store, organize, and retrieve various data we have, and this can be done anywhere. Software and hardware support is the perfect choice (Dinata and Marlim 2020)

Advances in information technology continue to evolve in line with human needs for ease, speed, and accuracy in obtaining information. Therefore, advancements in information technology must be continuously pursued and its quality and quantity must be improved (Tangkowitz, Palilingan, and Liando 2021) In line with the development of information technology, supporting equipment for computer networks remains essential. Equipment has also become a crucial component in the development of computer networks (Siddik, Lubis, and Sahren 2023).

Interconnected-networking is a large interconnected network of computer networks that connect people and computers around the world, via telephone, satellite and other communication systems, the internet is formed by millions of computers connected together from all over the world, providing a way for information ranging from text, images, audio, video, and others to be sent and enjoyed together (Novianto, Japriadi, and

Tommy 2023). The internet can be defined as a collection of several computers or millions of computers around the world that are interconnected through fiber optic cables, satellites or telephone lines. Internet use is currently a fairly important need in all fields and one of them is in the field of education such as in schools. Internet use in the school environment is not only carried out by teachers and employees, but also by students. To access the internet which is generally used in schools, universities, and offices, the internet used will become unstable or there will be a fight for bandwidth due to uneven bandwidth distribution, so bandwidth management is needed.

Good bandwidth management requires establishing and maintaining rules regarding connection availability, particularly the internet. Minimum bandwidth is defined as the bandwidth allocated to a class within a network. Those assigned this minimum bandwidth will retain their allotment. Maximum bandwidth is defined as the bandwidth limit a class can use. When traffic is low, a class can use the maximum bandwidth.

Unfettered Wi-Fi access can also lead to limited access, especially in schools where students can access Wi-Fi without restrictions. Therefore, to prevent time restrictions, students can only access the internet during class hours. SMK Taruna Masmur Pekanbaru is a private school located in Pekanbaru, located on Jl. Soekarno-Hatta, Sidomulyo. SMK Taruna Masmur Pekanbaru has 93 students and 18 teachers. Network issues often occur when logging in, and there is constant competition for bandwidth when using the internet. Therefore, adequate internet network management and a stable connection are essential. Internet bandwidth management is needed to distribute it equally among users and improve security to facilitate monitoring of usage.

Simple Queue is a bandwidth management method that is easy to configure. The bandwidth allocation is set at a fixed rate, so regardless of the number of users online, the bandwidth remains constant and tends to decrease. In the Simple Queue process, all packets are sorted, requiring them to pass through each queue before reaching their destination computer. In a Queue Tree, all packets pass through simultaneously without prior sorting, resulting in longer delays. It regulates the flow of data packets in both download and upload directions.

(Nendi and Putra 2023) entitled "Building a Mikrotik-Based Hotspot Server at Sman 1 Praya Tengah" this research computer networks both wireless and cable can be managed with mikrotik, maximum internet bandwidth distribution (1 Mbps), minimum (256 Kbps) then for maximum and minimum uploads the same (128 Kbps), with the presence of mikrotik providing ease of internet use and network security systems provided by mikrotik so that it can be facilitated well and for networks that use cables such as other computers still use static IP while the Hotspot facility uses DHCP IP. The use of the user manager can provide valid data reports on internet access for both administrators and users (Novianto, Japriadi, and Tommy 2023). In addition, monitoring using Mikrotik and using the Winbox application for configuration so that the admin can limit users and distribute bandwidth, so that rooms that prioritize the Internet network are given sufficient bandwidth (rujukan). Simple Que can also be used for user management and bandwidth management methods, clients who use hotspot services get inappropriate bandwidth quality because there is no user management and bandwidth sharing between hotspot users (Novianto, Japriadi, and Tommy 2023)

2.0 LITERATURE REVIEW

2.1 Bandwidth Management

Bandwidth management can be defined as the process of measuring and controlling the exchange of information within a computer network, thereby avoiding undesirable events that could lead to network congestion and reduced network capacity. Good bandwidth management must establish and maintain rules regarding connection availability (in this case, the internet). Minimum bandwidth is defined as the bandwidth assigned to a class within a network. When traffic is high, the class we refer to as a computer network will have at least two computers or devices connected to each other (Kurniawan, Putra, and Syaputra 2023)

2.2 Bandwidth

Bandwidth is the size of the transmission channel through which information or data passes. It indicates how much data can be transmitted over a network connection. Bandwidth management on a computer network is necessary to regulate the data flow, ensuring fair distribution. Because a network with many users requires a bandwidth management mechanism, bandwidth management using a MikroTik router ensures a smooth internet connection because the bandwidth at Tri Mitra Karya Mandiri Polytechnic has been distributed to each computer in each department, according to the bandwidth requirements needed to complete daily work or tasks (Anwar 2022; Nendi and Putra 2023)

2.3 Simple Queue

Simple Queue is a bandwidth management method that is easy to configure. The bandwidth allocation is set at a fixed rate, so regardless of the number of users online, the bandwidth remains constant and tends to decrease.

Simple Queue is the easiest bandwidth management method applied to small to medium-scale networks to regulate upload and download bandwidth usage for each user (Indrawan, Ruuhwan, and Sudiarjo 2024; Siddik, Lubis, and Sahren 2023)

2.4 Computer Networks

A computer network can be defined as a collection of computers and other computer-supporting devices interconnected as a single unit. Computer network media can be wired or wireless, allowing network users to exchange information, such as documents and data, print on the same printer, and share network-connected devices and software (Putra, Adnyana, and Jasa 2021). Ccomputer network is a group of autonomous computers that use communication protocols to share data, information, application programs, and hardware, and to communicate with each other (Sari et al. 2022).

3.0 METHODOLOGY

3.1. Research Framework

This research framework has a function in explaining the stages and processes of designing a hotspot system.

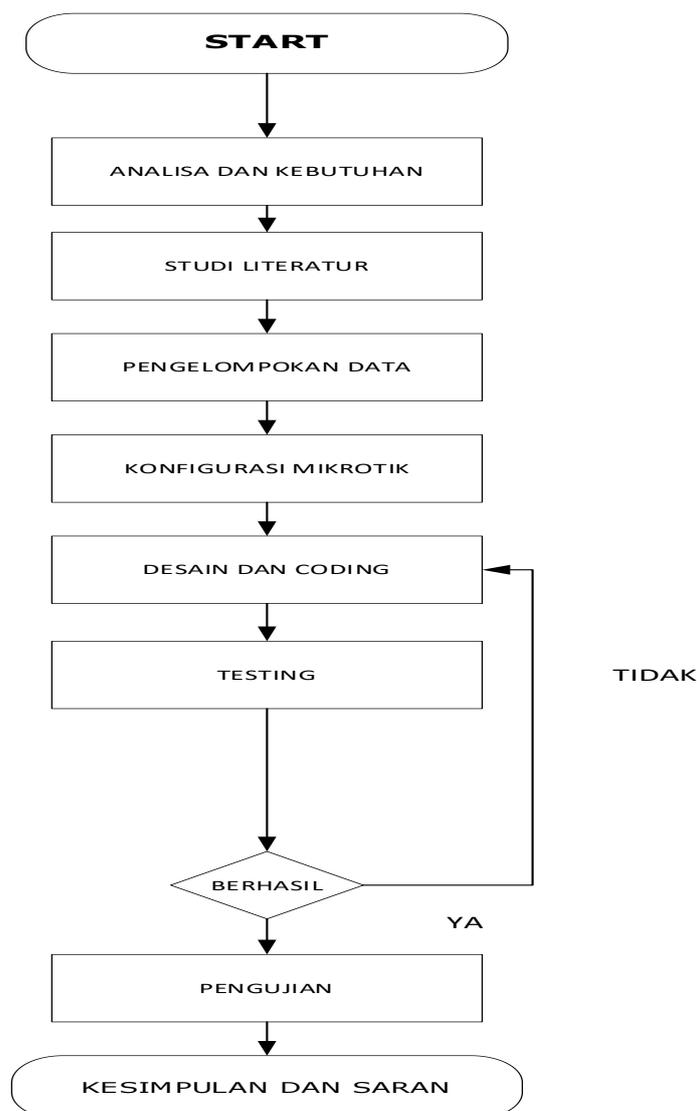


Figure 1. Research Framework
Needs Analysis

First, Needs Analysis. At this stage, the researcher analyzes the research requirements, then conducts interviews and observations in the field. Second, Literature Study. At this stage, the researcher collects and analyzes data

from journal sources related to hotspot information systems and bandwidth management, followed by expert interviews. Third, Data Grouping. At this stage, the researcher categorizes the data to be used for the research. These data include teachers, students, and administrators, as well as information on previous network usage. Fourth, Mikrotik Configuration.

The next stage, the researcher selects and uses Mikrotik components to build, conducts assembly testing, and configures Mikrotik using Winbox. After assembly is complete, the researcher designs and develops a website-based application using PHP and MySQL programming languages, which is coded. Testing: After the design is complete, testing is conducted to determine whether it runs smoothly. If the test results are successful, the research is complete, and conclusions and recommendations are drawn. If the results are still unsuccessful, the researcher will redesign the system. Finally, testing is carried out. After the testing is run and no errors are found, the research is conducted. If the test results are successful, the research is complete, and conclusions and recommendations will be drawn. If the results are still unsuccessful, the researcher will redesign the system. Testing is conducted using black box testing.

3.2. System Development Methods

The Network Development Life Cycle (NDLC) is a model that defines the design or development process cycle of a computer network system. The NDLC has elements that define specific phases, stages, steps, or process mechanisms. The word "Cycle" is a descriptive keyword for the network system development life cycle, describing the overall process and stages of continuous network system development. This method serves as a reference (either overall or in general) in the development and design of computer network systems. The design method used by the author is Network Development Life Cycle.

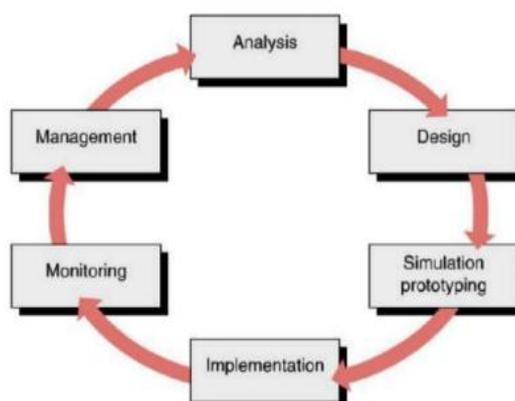


Figure 2. Network Development Life Cycle (NDLC)

The Analysis Phase is the initial stage in the analysis process. It involves analyzing needs, analyzing existing problems, analyzing user requirements, and analyzing existing network topologies. This phase is the data collection phase needed to formulate problems and address existing constraints. This is followed by the Design Phase. This phase, based on the previously obtained data, creates the required design. Third, the Simulation Prototype Phase. This phase involves developing the network, creating simulations using tools. This phase aims to assess the performance of the network to be built and serve as material for presentations and sharing with network system developers. Next, the Implementation Phase. This phase takes a little longer. The implementation phase ensures that everything previously planned and designed has been implemented. The Monitoring Phase: After implementation, monitoring is crucial to ensure the network and communications operate according to the author's intentions and objectives from the initial analysis phase. Finally, the Management Phase. This phase focuses on policy issues, particularly in terms of activities, maintenance, and management.

4.0 RESULTS AND DISCUSSION

4.1 Use Case Diagram

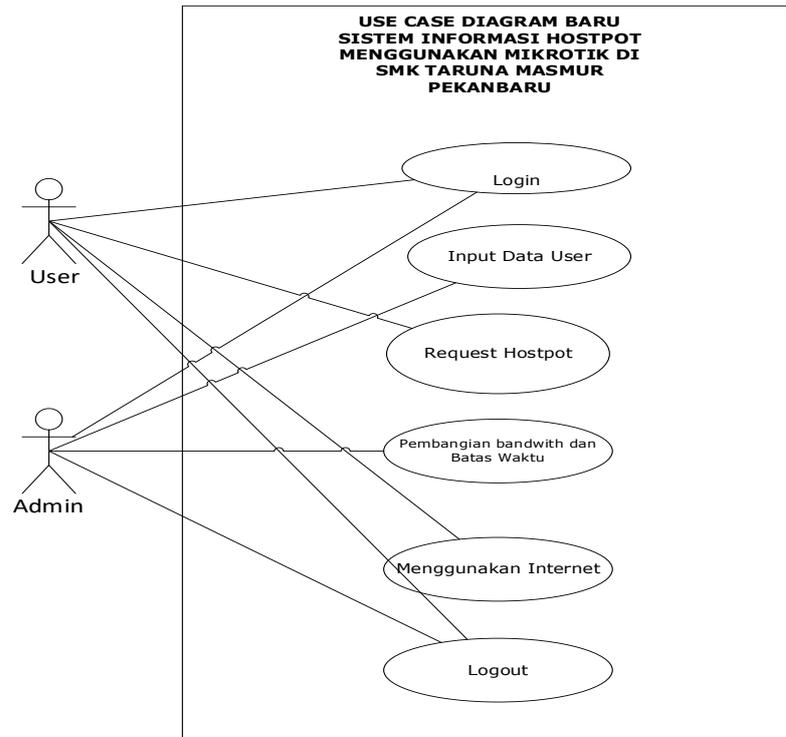


Figure 3. Use Case Diagram

4.2 Simple Queue Simulation Using Winbox

The initial step is to log in to Winbox, as shown in Figure 4 below. Click on the MAC Address and then click the connect button.

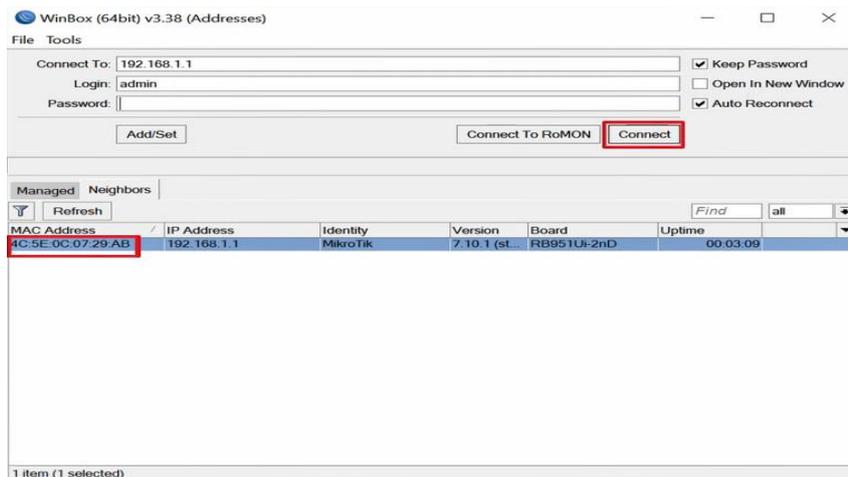
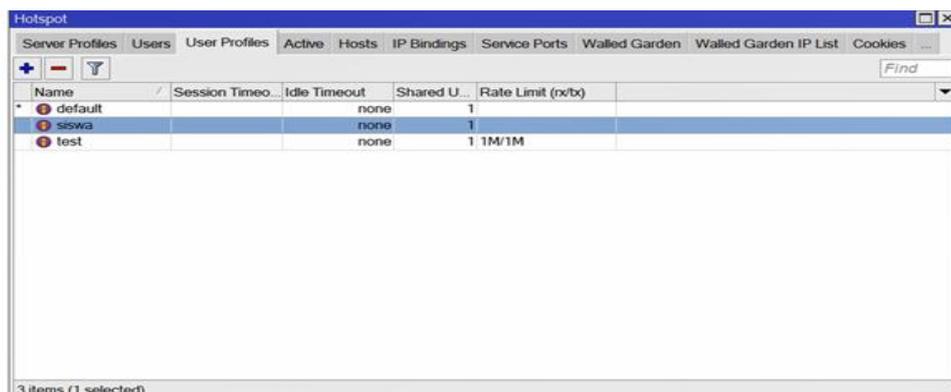


Figure 4. Login Winbox

After logging in and selecting the connect button, a display like the one in figure 5 will appear below.



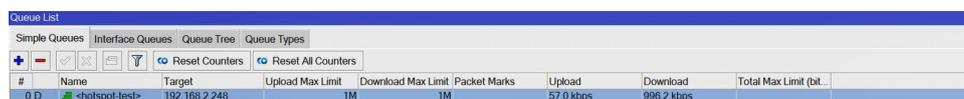
In Mikrotik, under IP, Hotspot, User Profiles, the command displays the user and sets the rate limit to 1M/1M, as shown in Figure 5.



Name	Session Timeo...	Idle Timeout	Shared U...	Rate Limit (x/xb)
default		none	1	
sswa		none	1	
test		none	1	1M/1M

Figur 5. User Profile Winbox

Simple Queues will add rows according to the upload and download settings that have been set, as seen in Figure 6.



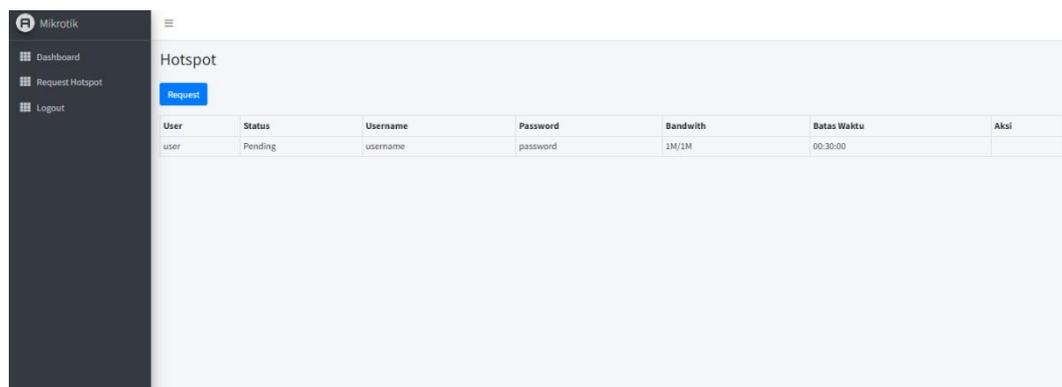
#	Name	Target	Upload Max Limit	Download Max Limit	Packet Marks	Upload	Download	Total Max Limit (bit...)
0 D	hotspot-test	192.168.2.248	1M	1M		57.0 kbps	996.2 kbps	

Figure 6. Simple Queue

4.3 System Implementation

a. The Hostpot Request page

The Hostpot Request page is where users make host requests to get a username and password to log in to the hotspot, as seen in the image 7



User	Status	Username	Password	Bandwith	Batas Waktu	Aksi
user	Pending	username	password	1M/1M	00:30:00	

Figure 7. Hotspot Request Page

a. Hotspot Approve Page

The Approve Hostpot page is where the admin approves the hotspot, the admin can set the bandwidth, access time limit, username and password, to get the user username and password to log in to the hotspot, as shown in the image.



Figure 8. Hotspot Approve Page

5.0 CONCLUSION

The application was built to manage Mikrotik-based bandwidth. The application can divide bandwidth according to school needs. The hotspot information system application was tested, with the admin being able to set the number of users, bandwidth, time limit, the user makes a hotspot request and is then approved by the admin, so that the admin can get settings from the hotspot settings, the user can log in to the hotspot after getting hotspot approval from the admin. This application can make it easier for schools to manage their networks.

References

- Anwar, Muhammad Syaiful. 2022. "Analisis QoS (Quality of Service) Manajemen Bandwidth Menggunakan Metode Kombinasi Simple Queue Dan PCQ (Per Connection Queue) Pada Fakultas Teknik Universitas Islam Sumatera Utara." *sudo Jurnal Teknik Informatika* 1(2): 82–97.
- Dinata, Chandra Putra, and Yulvia Nora Marlum. 2020. "Application of Dynamic Systems Development Method in WEB-Based Promotion Media." *Journal of Applied Business and Technology* 1(3): 196–204.
- Indrawan, Telly, Ruuhwan, and Aso Sudiarjo. 2024. "Perbandingan Metode Simple Queue Dan Metode Per Connection Queue PERBANDINGAN METODE SIMPLE QUEUE DAN METODE PER CONNECTION QUEUE UNTUK MANAJEMEN BANDWIDTH (STUDI KASUS SMP NEGERI 2 SINGAPARNA)." : 58–65.
- Kurniawan, Indra, Dian Eka Putra, and Aldo Eko Syaputra. 2023. "Perancangan Jaringan Hotspot Di Universitas Nahdlatul Ulama Sumatera Barat Menggunakan Mikrotik Dalam Manajemen Bandwidth." *Jurnal TEFSIN (Jurnal Teknik Informatika dan Sistem Informasi)* 1(1): 21–25. www.MikroTik.com.
- Nendi, and Dennis Andika Putra. 2023. "Manajemen Bandwidth Dengan Metode Peer Connection Queue (PCQ) Dan Simple Queue Di Perumahan PPH 2." *Jurnal Sains dan Teknologi* 5(1): 96–99. <https://ejournal.sisfokomtek.org/index.php/saintek/article/view/1353>.
- Novianto, Dian, Yohanes Setiawan Japriadi, and Lukas Tommy. 2023. "Optimalisasi Koneksi Local Area Network (LAN) Menggunakan Metode Fasttrack Pada Routerboard Mikrotik." *Jurnal Media Infotama* 19(1): 224–29.
- Putra, Ida Bagus Agung Eka Mandala, Made Sri Indra Dewi Adnyana, and Lie Jasa. 2021. "Analisis Quality of Service Pada Jaringan Komputer." *Majalah Ilmiah Teknologi Elektro* 20(1): 95.
- Sari, Indah Purnama, Ismail Hanif Batubara, Mhd. Basri, and Al Hamidy Hazidar. 2022. "Implementasi Internet of Things Berbasis Website Dalam Pemesanan Jasa Rumah Service Teknisi Komputer Dan Jaringan Komputer." *Blend Sains Jurnal Teknik* 1(2): 157–63.
- Siddik, Mohd, Adi Prijuna Lubis, and Sahren Sahren. 2023. "Optimalisasi Kecepatan Jaringan Internet Pada Mts Daarussalam Menggunakan Metode Simple Queue." *Journal of Science and Social Research* 6(1): 117.
- Tangkowit, A. E., V. R. Palilingan, and O. E. S. Liando. 2021. "Fakultas Teknik Pendidikan Teknologi Informasi Dan Komunikasi Universitas Negeri Manado 2014." *EduTIK: Jurnal Pendidikan Teknologi Informasi dan Komunikasi* 1(1): 69–82. <https://www.academia.edu/download/93681630/1286.pdf>.