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Mikrotik-based Hotspot Network Design Using the User Manager Authentification Method at SMKN 4 Bengkulu Selatan

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Abstract: Hotspot is a wireless internet access distribution media that has an authentication system for its users. Because with the hotspot system, internet access users are required to go through a network authentication stage by entering a username and password before being able to connect to the internet. Without systematic management, problems in hotspot services will occur very often. SMKN 4 Bengkulu Selatan has used an internet connection. However, the internet connection used has not been optimized, especially in terms of hotspot user management. This can cause several obstacles when accessing the internet, including the lack of security so that all users can access the internet only by entering the provided wifi password, the absence of user monitoring so that they do not know which hotspot users are active or inactive and the absence of bandwidth limitations for each user which results in unfair bandwidth usage often occurs. This study aims to design a hotspot network using Mikrotik devices with the implementation of the User Manager authentication method at SMKN 4 Bengkulu Selatan. The goal is to improve the security and management of internet access for users in the school environment. This study involves needs analysis, network topology design, and authentication protocol implementation. This method is expected to provide an effective solution in internet access management in educational environments.

Keywords: Design, Network, Hotspot, NDLC, Authentication

Introduction

The use of the internet is currently a fairly important need 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 carried out by teachers and employees, but also by students. The internet is used to surf for information, find other learning resources, or for information systems in schools. The development of internet use makes the internet a demand and one of the needs for its users. One of the facilities that is often provided for internet users is a hotspot. A hotspot is a place that has internet services using Wireless LAN technology that can be accessed via a computer or other device. Hostspot is also an innovation in local computer network technology to overcome the limitations of computer network technology that uses cables and makes the implementation of wireless networks appropriate because it can increase user mobility (Mafakhiri., 2021)

SMKN 4 Bengkulu Selatan is one of the State Vocational Schools located on Jl. Kedurang Ilir, Nanjungan Village, Kedurang Ilir District, South Bengkulu Regency. Currently, SMKN 4 Bengkulu Selatan has wi-fi using an access point that is not well

managed for its students, so the author is interested in designing a hotspot network with a login system on the school network as a system or way to make it easier for users to connect the network to the internet. SMKN 4 Bengkulu Selatan as an educational institution requires an efficient and secure hotspot network system to support learning activities and internet access for students and staff. However, currently, there is no optimal hotspot network infrastructure. Therefore, it is necessary to design a hotspot network based on Mikrotik with the User Manager authentication method to improve security and manage internet access effectively in the school environment. Through this research, it is expected to provide the best solution that supports the teaching and learning process and administrative activities at SMKN 4 Bengkulu Selatan. This Mikrotik Usermanager feature has Authentication, Authorization and Accounting (AAA) functions for hotspot user management. (Dwi Septiarini and Sasmita Susanto., 2021. RADIUS stands for Remote Access Dial In User Service, is a UDP-based connectionless protocol that does not use a direct connection and is marked with a UDP field that uses port 1812. The Radius server itself is an access control mechanism that checks and authenticates users or users based on the authentication mechanism using the challenge/response method. While Userman is a RADIUS server application that can be used for management including HotSpot users, PPP users (PPtP / PPPoE), DHCP users, wireless users, and RouterOS users. By managing a system on a computer network, it will make it easier for administrators to be more effective and efficient in processing the network, especially in the processing of users who are connected to the computer network using wireless (Fauzi et al., 2020).

Methodology

Based on the results of a survey in the lab building of SMKN 4 Bengkulu Selatan, it has not been managed properly, therefore internet access at school is slow because it is not an authorized user using the internet at the school, internet access is not well managed. The internet is used to surf for information, search for other learning resources, or for information systems at school. The research was conducted at SMKN 4 Bengkulu Selatan, starting from June 2024 to August 2024. The implementation method used in this research is by using NDLC. The stages in this implementation method are as follows.:

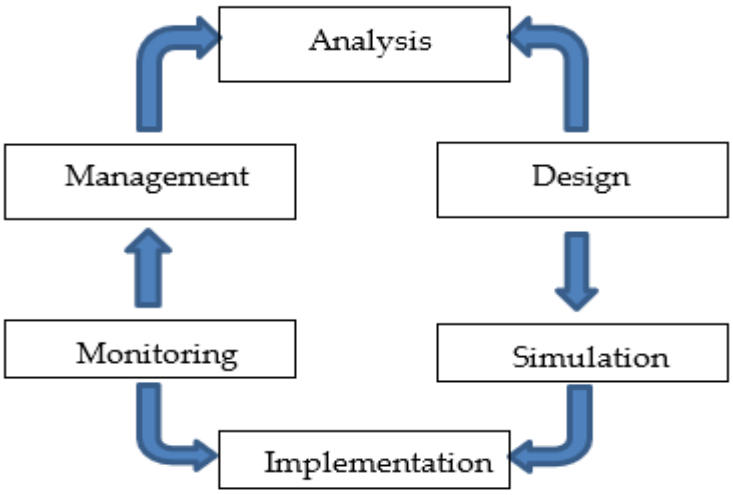

Figure 1. Stages of the NDLC Method

Description:

1. Analysis
   Analysis of network problems in SMKN 4 Bengkulu Selatan school, analysis of existing topology/network, and analysis of solutions to problems.
2. Design (Configuration Design)
   Create a topology design drawing of the interconnection network to be built and carry out a scheme or configuration design that will be used on the SMKN 4 Bengkulu Selatan network.
3. Simulation
   Testing the system to enter the Mikrotik configuration, making it in the form of a simulation with the help of special tools in the network field.
4. Implementation
   Implementing everything that has been planned and designed previously. Monitoring
5. After carrying out the implementation, the monitoring stage is an important stage so that the network runs as expected.
6. Management
   Creating/arranging so that the system that has been built and runs.

Result and Discussion

Result

The current computer network is only used when there is an exam, with the development of the current computer network into a hotspot network based on mikrotik using the user manager authentication method at SMKN 4 Bengkulu Selatan, so that the network will be more useful in helping learning and teaching activities at SMKN 4 Bengkulu Selatan. The results of this study are to build a hotspot network based on mikrotik using the user manager authentication method at SMKN 4 Bengkulu Selatan. Where the hotspot network based on mikrotik using the user manager authentication method at SMKN 4 Bengkulu Selatan can be used by using the username and password of each student obtained from the network admin (operator), where the username and password can only be used on one device with a predetermined access speed. The tests carried out include:

Login Results

To be able to use the hotspot network at SMKN 4 Bengkulu Selatan, students, teachers and education staff must first log in. The login page display can be seen in the image below:

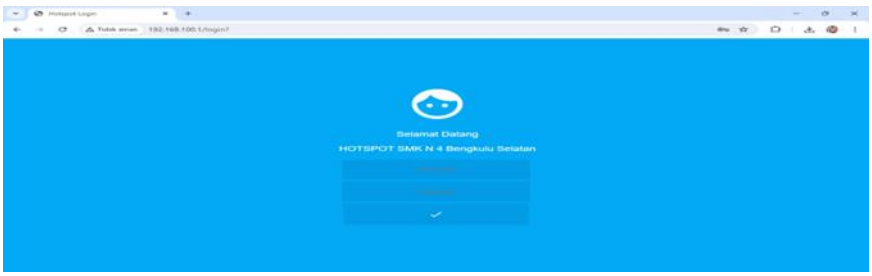

Figure 2. Hotspot Login Page View

If successful in logging in, Hotspot network users at SMKN 4 Bengkulu Selatan can access the internet network, as can be seen in the image below:

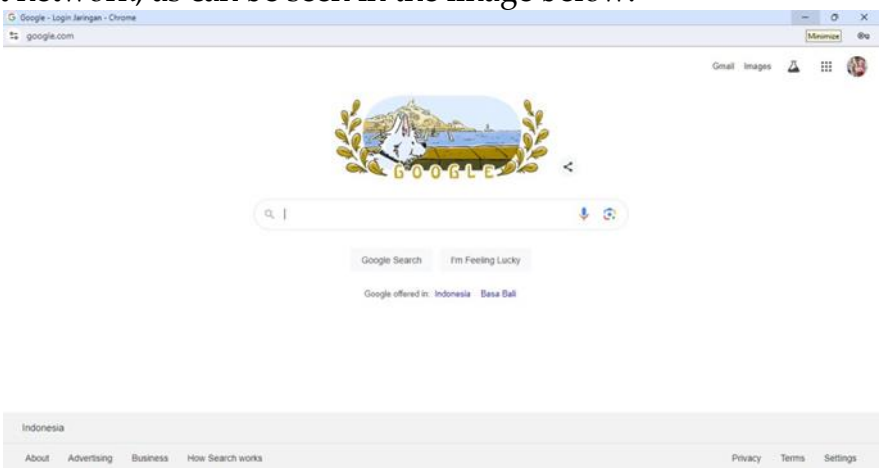

Figure 3. Successful Internet Access Display

To see the user status, you can access 192.168.100.1/status, as can be seen in the image below:

Figure 4. User Status Page View

From the display above, it can be seen that the user with the name admin1 gets the IP Address 192.168.100.254. Meanwhile, for users who fail to log in, an error message will appear on the login page, as can be seen in the image below:

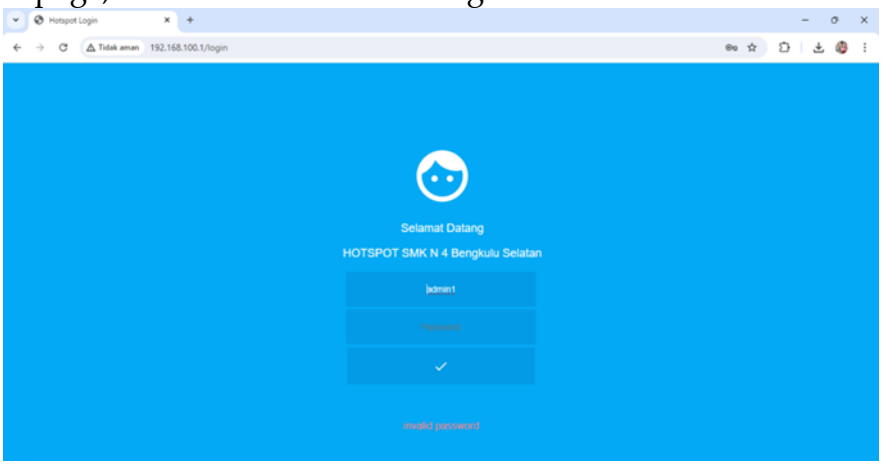

Figure 5. Failed Login Page View

From the image above, you can see the error message " invalid password ", which means the password is wrong, while to see the log, you can see it directly as in the image below:

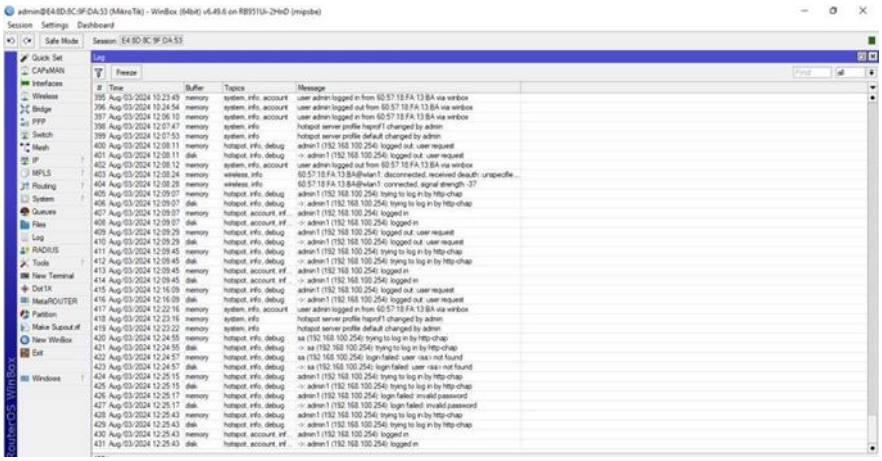

Figure 6. Log View On Router

Ping Results

Ping is performed to ensure that the device (computer, modem, and router) is connected. The ping tests performed include:

Ping Computer to Router

Pinging a computer to a router can be done by typing the ping command from the computer to the router IP (ping 192.168.100.1), as can be seen in the image below:

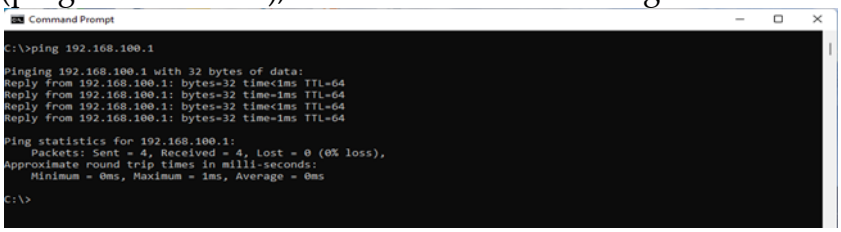

Figure 7. Ping View to Connected Router

From the image above, you can see that *the ping* from the computer to the connected *router* is marked with *ping. reply* , while *ping* is not connected, as can be seen in the image below:

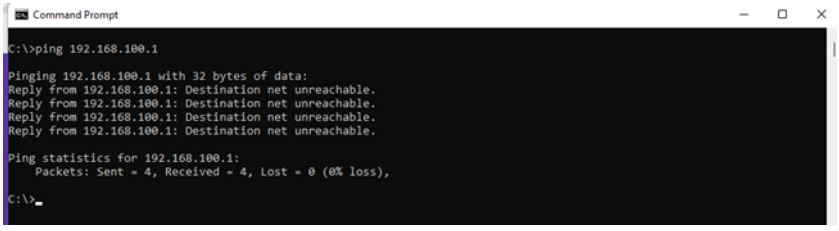

Figure 8. Ping Display to Router Not Connected

From the image above, you can see that the ping from the computer to the router is not connected, indicated by ping “destination net unreachable”

Ping Router to Modem

Ping Router to modem can be done by typing the ping command from the router to the modem IP (ping 192.168.1.1), as can be seen in the image below:

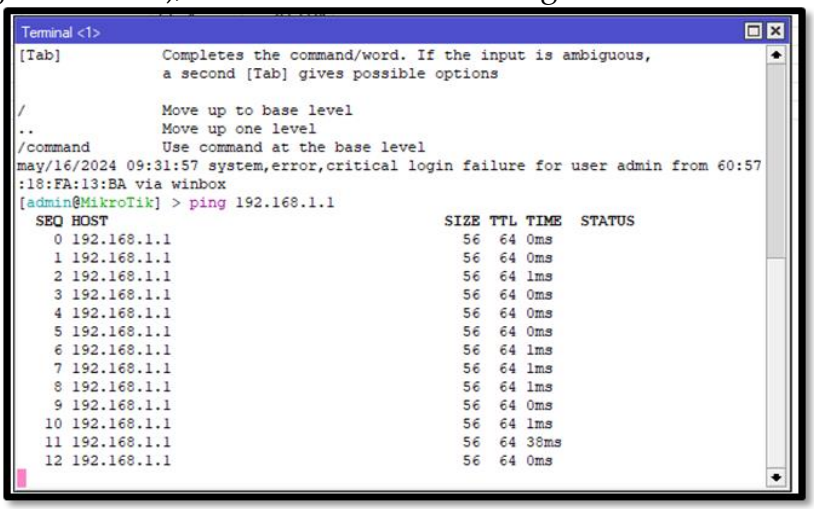

Figure 9. Ping Display Router to Modem

From the image above, you can see that the ping from the router to the modem is connected, indicated by ping. Reply.

Ping Router to Internet

Ping The router to the internet can be done by typing the ping command from the router to Google DNS (ping 8.8.8.8), as can be seen in the image below:

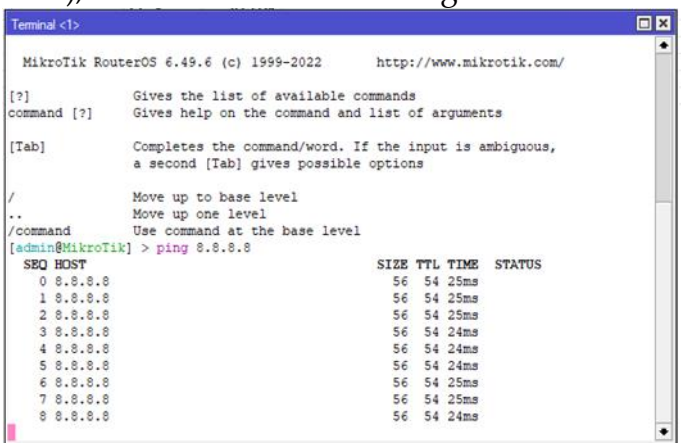

Figure 10. Ping View Router to Internet

Discussion

Mikrotik-based hotspot network using user manager authentication method at SMKN 4 Bengkulu Selatan , used as a liaison between the user and the Modem which then to the internet network . The user will log in on the login page that has been provided, the account used will be sent via the router to the modem on the router to be matched and will also send user data to the data on the router so that the router can read user data such as username, IP Address and so on.

Conclusion

The conclusions that can be drawn after implementing a hotspot network based on Mikrotik using the user manager authentication method at SMKN 4 Bengkulu Selatan are as follows:

1. With the use of a Mikrotik router in the computer network usage system, the Mikrotik-based hotspot network using the user manager authentication method at SMKN 4 Bengkulu Selatan has become better and more structured in its use.
2. Mikrotik-based hotspot network using the user manager authentication method at SMKN 4 Bengkulu Selatan can only be used by one account on one device.

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