



Design and Build a Wireless Network Using a Voucher System with an OS Router

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Abstract. The development of hotspot networks is the need for fast and easy internet access anywhere. With the development of technology and the increasing importance of the internet in everyday life, hotspot networks are a practical solution to meet the needs of public internet access. In addition, the hotspot network is also a solution to overcome the limitations of internet access which is limited to wired networks. With a hotspot network, users can access the internet more easily without being tied to the location and distance of a wired network. Hotspot networks also have benefits for agencies and universities. By providing fast and easy internet access for users, it can increase comfort and increase efficiency in accessing online information and services in academic activities. Wireless Network using a voucher system is a good model to solve this problem.

Keywords: Networks; Wireless; Internet, Hospot, Voucher

1. Introduction

To get information quickly, a communication technology called the internet is needed. With the internet, everyone can communicate and exchange information with each other. A computer network is a collection of several computer and other devices such as routers and switches. On a network that has many users, problems arise in the form of unstable internet connection speed, one of which is the impact of users using it simultaneously. To prevent this from happening, it is necessary to regulate bandwidth which aims to prevent the quality of network services from decreasing which results in other user connections. The problem now is that the Electrical Engineering department has an internet network service, but it does not cover all the available rooms, as a result students do not have sufficient access to information or lecture material during lectures because of the limited internet access available.

By looking at the existing problems, it is necessary to provide internet facilities, which are implemented in the form of hotspots. With the hotspot service, students and lecturers while in the electrical engineering department can access the internet properly. Hotspot technology is useful for managing bandwidth, so that the process of providing internet services can be received equally by every user connected to the existing internet network. This is to prevent excessive bandwidth usage by existing

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internet users because excessive bandwidth usage will cause the quality of service to decrease thereby disturbing other users when accessing the internet.

The hotspot technology that has been built will be implemented in the form of installing hotspot points in the electrical engineering department. This hotspot point allows users to connect to the existing internet service network as long as they are within the range of the hotspot point area.

2. wireless network with os router

A. Mikrotik RouterOS

Mikrotik RouterOS is an operating system that is intended as a network router. Mikrotik RouterOS itself is an operating system and software that can be used to turn an ordinary computer into a reliable network router, including various features created for IP networks and wireless networks. These features include Firewall and NAT, Hotspot Routing, Point to Point Tunneling Protocol, DNS Server, DHCP server, Hotspot and various other features. Mikrotik RouterOS is a Linux-based operating system that is intended as a network router. Designed to provide convenience for its use. Administration can be done via the Windows Application (Winbox). Apart from that, installation can be done on a standard PC computer. The PC that will be used as a Mikrotik router also does not require large enough resources for standard use, for example only as a gateway. For large load requirements (complex networks, complicated routing) it is recommended to consider selecting adequate PC resources. Mikrotik RouterOS is a version of Mikrotik in software form that can be installed on a home computer (PC) via CD. The Mikrotik RouterOS image file can be downloaded via the official Mikrotik website. However, the image file is a trial version of Mikrotik which can only be used for 24 hours. To be able to use it full time, you have to buy a license key, provided that one license is only for one hard disk.

Mikrotik RouterOS exists in various levels. Each level has its own abilities, starting from level 3, to level 6. Briefly. Level 3 is used for routers with Ethernet interfaces, level 4 for wireless clients or serial interfaces, level 5 for wireless APs and level 6 does not have any limitations. For hotspot applications, level 4 (200 users), level 5 (500 users) and level 6 can be used. First, confirm that you have the correct template for your paper size. This template has been tailored for output on the A4 paper size. If you are using US letter-sized paper, please close this file and download the file "MSW_USltr_format".

B. Mikrotik RouterBoard

Mikrotik RouterBoard is an embedded router product from Mikrotik. This routerboard is like an integrated mini PC because the processor, RAM, ROM and Flash memory are embedded in one board. Routerboard uses RouterOS which functions as a network router, bandwidth management, proxy server, DHCP, DNS server and can also function as a hotspot server. There are several series of routerboards that can also function as WiFi clients, including the RB411, RB433, RB600 and most wireless ISPs use routerboards to carry out their wireless functions either as an AP or client. By using this routerboard, you can carry out router functions without depending on a PC,

this is because all the router functions are already on the routerboard. When compared to a PC with RouterOS installed, the routerboard is smaller, more compact and saves electricity because it only uses an adapter. To be used on a WiFi network, it can be installed on a tower and uses Poe as the current source.

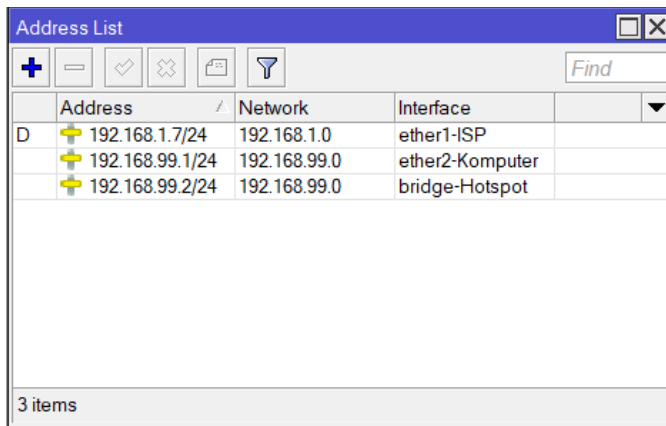
3. result and discussion

At the implementation stage, install and configure the required equipment, such as configuring the router, AP and voucher server.

C. RouterBoard Configuration

The first step in configuration is naming the ether according to your needs. On the Winbox menu, click interface, after entering the interface menu, double click on ether 1 to 10.

After naming the ether according to existing needs, next create a bridge to combine ether 3 to 10 for hotspot needs. In the Winbox menu, click bridge, then in the bridge menu, click the add button, then give a name to the bridge, after giving a name to the bridge, in the bridge menu, click the ports menu to combine ether 3 to 10. Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Abbreviations such as IEEE, SI, MKS, CGS, sc, dc, and rms do not have to be defined. Do not use abbreviations in the title or heads unless they are unavoidable.



The screenshot shows the 'Address List' window in Mikrotik WinBox. It contains a table with three rows of IP address configurations. The columns are 'Address', 'Network', and 'Interface'. The first row is for 'ether1-ISP' with address 192.168.1.7/24 and network 192.168.1.0. The second row is for 'ether2-Komputer' with address 192.168.99.1/24 and network 192.168.99.0. The third row is for 'bridge-Hotspot' with address 192.168.99.2/24 and network 192.168.99.0. The status 'D' is shown in the first column of each row. The window also has a search bar and several icons at the top.

	Address	Network	Interface
D	192.168.1.7/24	192.168.1.0	ether1-ISP
	192.168.99.1/24	192.168.99.0	ether2-Komputer
	192.168.99.2/24	192.168.99.0	bridge-Hotspot

3 items

Fig. 1. IP Address Setting

On the Winbox menu, click IP then select the address menu to provide an IP address on each interface Address. Then we set the configuration of DNS, IP Hotspot and Mikrotik Hotspot.

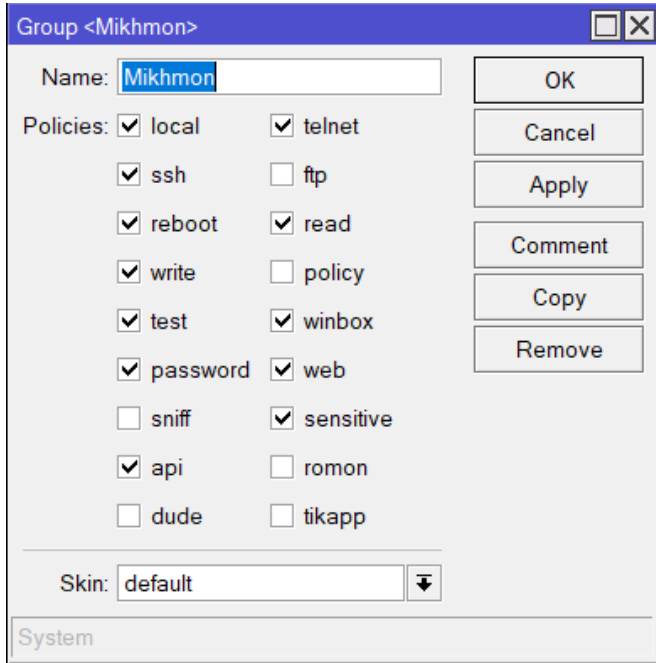


Fig. 2. Mikhmon Setting

D. Mikhmon Configuration

The first step is Log in to the Mikhmon server. Then login to Mikhmon using the default ID and password. Afterthat fill in the Mikrotik IP and DNS name to connect the Mikhmon and Mikrotik

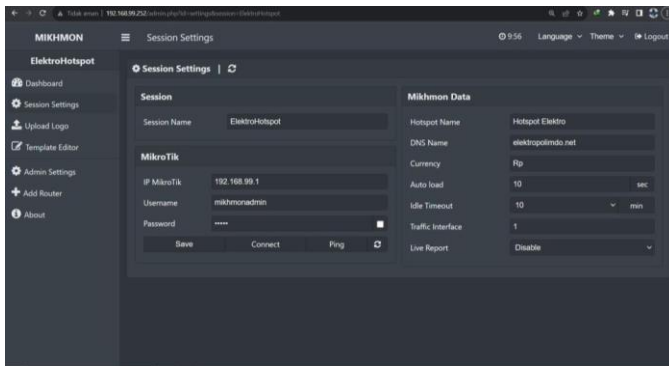


Fig. 3. Mikhmon Configuration

After do the Mikrotik Monitor successfully, we can set the all users. We can set the user that will access privilege of using this bandwidth of this internet using. Based on the value that we set, the all user in this system can access the internet connection that

can be monitoring and arranging the number of internet data bandwidth by the administrator. The administrator can input the new input by the request of the user. So the administrator will make a limitation of the user privilege and internet access capacity in this internet connection. The figure below show the admin input the user into the system.

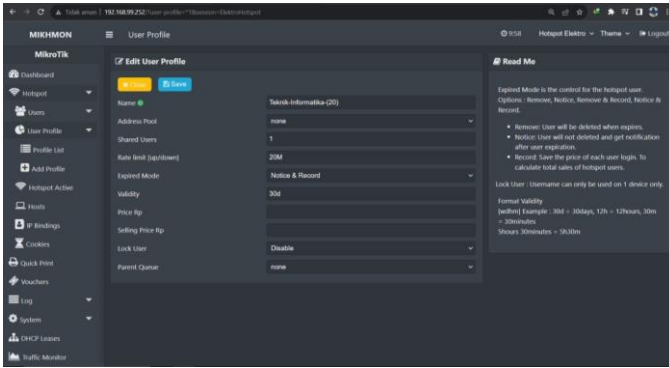


Fig. 4. Input the new user client

E. Result Simulation

The figure below show us the result of the wireless network based on voucher using OS Router. .

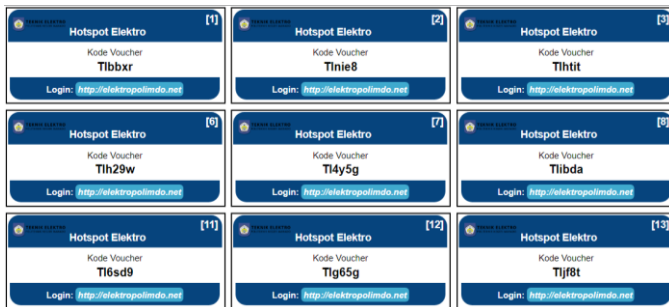
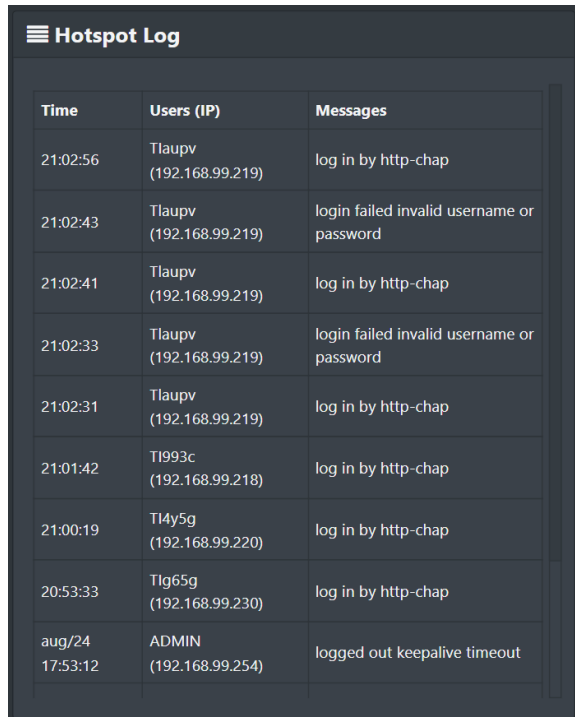


Fig. 5. The Voucher Design

After set the voucher that can be set into the users, we can monitor all the log activity of the user.



Time	Users (IP)	Messages
21:02:56	Tlaupv (192.168.99.219)	log in by http-chap
21:02:43	Tlaupv (192.168.99.219)	login failed invalid username or password
21:02:41	Tlaupv (192.168.99.219)	log in by http-chap
21:02:33	Tlaupv (192.168.99.219)	login failed invalid username or password
21:02:31	Tlaupv (192.168.99.219)	log in by http-chap
21:01:42	Tl993c (192.168.99.218)	log in by http-chap
21:00:19	Tl4y5g (192.168.99.220)	log in by http-chap
20:53:33	Tlg65g (192.168.99.230)	log in by http-chap
aug/24 17:53:12	ADMIN (192.168.99.254)	logged out keeplive timeout

Fig. 6. The Client Login Information

The fig.5 shows us the voucher design for the user in this system. So, the internet connection bandwidth is already set by the admin. So, the user can only use the number of the limited bandwidth based on the voucher set by the admin. The fig.6 shows us the user client record activity. The usage of the bandwidth based on the IP Address is on the screen already. So, the admin can control the usage of all user in this internet connection without open the data. It's only monitor the internet connection and bandwidth without playing with the data of the user. So, the data of the user is still safe. So, the both result based on the simulation in fig.5 and fig.6 show that the connection of every user can be monitor by the admin. The data of the user are still safe because the admin can only do the monitoring. The simulation show us that the internet connection for all user is given and controlled by the admin based on the voucher.

conclusion

By using OS Router, the problem of network bandwidth can be solved. We can use Mikrotik Monitor (Mikmon) easily by set it in a part of wireless network. This system can solve the problem of changing of Internet Service Provider because there are two alternative of server that provide our internet connection. This system provides a user-friendly interface that is very easy to the all operator and admin to manage the 1 of the vouchers. Based on this voucher, the using of internet bandwidth can be managed easily and safety. Comparing to the previous related research of this topic, this system is

better in safety because the admin can only do monitoring of the client user without get the data of the user. This voucher system is also better than the others reference system because the easier and more flexible comparing to another voucher system because of the using of Mikhmon (Mikrotik Monitoring) system application. It shown by the simulation display of voucher design and client login information. The using of dual internet service provider in Manado State Polytechnic will be improved the availability of this system.

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