

NETWORK SYSTEM IMPLEMENTATION USING MIKROTIK AND AT SMK NEGERI 9 MEDAN

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SMK Negeri 9 Medan is a school located on Jl. Patriot No. 20 A, Lalang, Kec. Medan Sunggal. This school is a school that is in great demand because this school has several majors related to computers. Besides that, there are also many labs for doing computer practicum. But there are problems that occur in the computer lab network. The network often has problems when logging in to the internet and so on. For this reason, it is necessary to have adequate internet network management, 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. In this study, the focus is on hacking the network system using a proxy, namely IP configuration, network topology and network design. To build a more stable network, namely using Winbox.

Keywords: Mikrotik, Bandwidth, Winbox

1. Introduction

The development of information technology is very quickly accepted by everyone, from small children to adults. Currently, information technology can have a major impact on people who receive the information, both in terms of economics, politics, and education. Sometimes information can have good and bad impacts depending on how the person processes and utilizes the information he gets, any information received by everyone will not be able to arrive without adequate facilities to channel and receive the information, facilities are needed to expedite the flow of information so that everyone can receive this information.

A local area network on a computer network is one of the simplest facilities for providing information to every computer that is connected to the same network, on this local area network each connected computer can share data and information from its storage media even with network facilities. With the local network, each computer can communicate, such as chat, which is already on the installed operating system or can install a chat application that supports communication on the local network or the internet to make it easier to share information with everyone who is connected to the local network or internet. One of the important facilities is the availability and easy access to internet information. One of the obstacles faced at SMK Negeri 9 Medan is the installation of a simple internet network so that when many users use it, the access feels very slow.

2. Research Methods

2.1 Research Stages

At this stage of research, it will be explained one by one how the system of this entire research will be built.



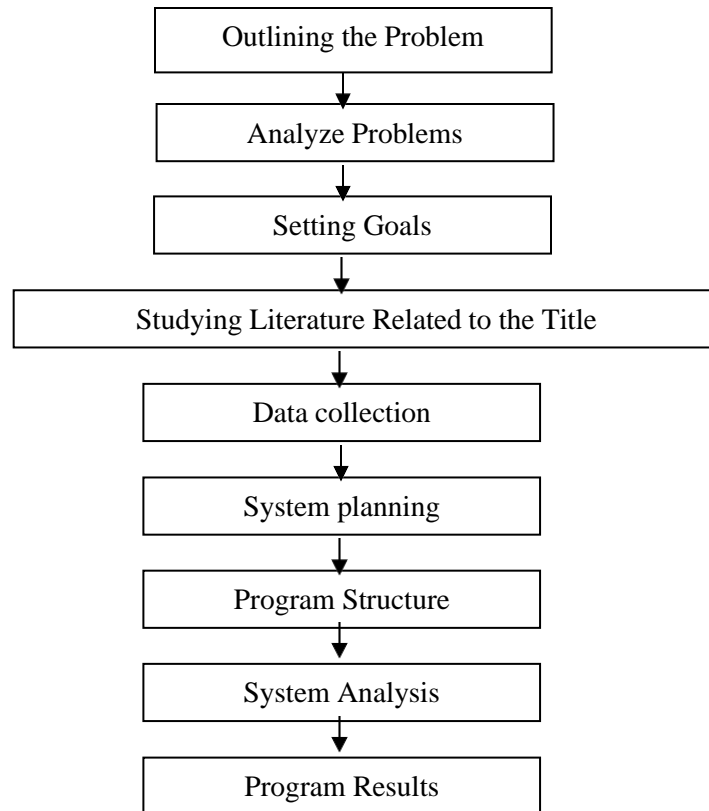


Figure 1 Research Stages Design

1. Outline the Problem

Describe the problem well to support in carrying out and implementing the implementation of a network system using a proxy and at the 9 Medan State Vocational School using Capsman as a media interface to be examined, the problem should be explained, making sure it is defined together with the limitations of the problem to be analyzed, for that there is no good solution of existing problems. So the next beginning is the most important thing in researching.

2. Problem Analysis

Decisions in case analysis are steps to understand the problems that have been explained. By describing the cases set, it is desired that the problems can be understood.

3. Determination of Final Goals

In this research, there are problems that will determine the ultimate goal to be achieved in research. This research aims to overcome the problems that exist in research.

4. In this study, there is some literature related to the research title. In order to achieve the goal, the researcher studies some literature that can be used in research. Then the literature studied is selected which can be used for this research

5. Data Collection

The data needed is data that is at the Deli Serdang company and the data that will be received is manual data.

6. System Analysis

In this research, system analysis is needed because here the author is asked to look for system deficiencies, problems experienced by the system, so that after being analyzed in order to find alternative ways to solve a problemff.

7. System Design

The author will measure the network system using a proxy and at the 9 Medan State Vocational School using Capsman.

8. Program Flow

The program flow model is the course of the program structure which describes the similarities between a program design and other systems.

9. Program Results

In this application, a network system using a proxy will be explained and at the Medan 9 State Vocational School.

2.2 Research Design

At this stage a physical topology design and a logical topology of the system to be built will be made, with the aim of being able to implement a network system using a network system using a proxy and at SMK Negeri 9 Medan.

1. Design of Physical Topology

The network topology at SMK Negeri 9 Medan that is used is a star topology, in which each local network is connected directly to the proxy via a switch in each room. The following is a picture of the designed topology. [4]

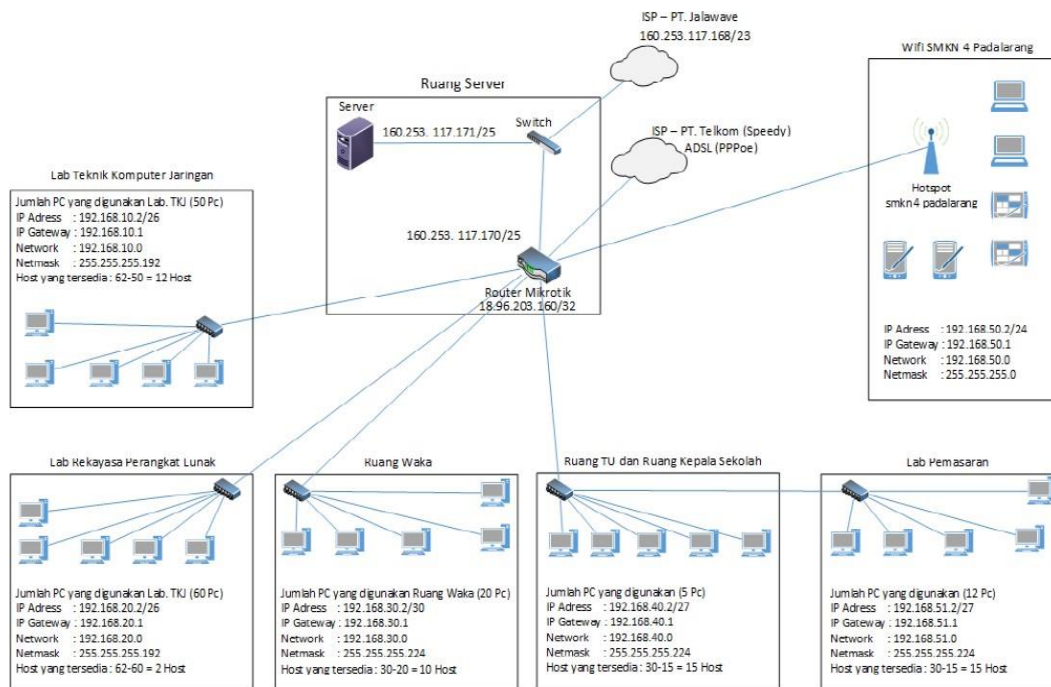


Figure 2 Network Topology Design

2. IP Address Design

IP address design from the physical topology design that has been made. can be seen in figure 3

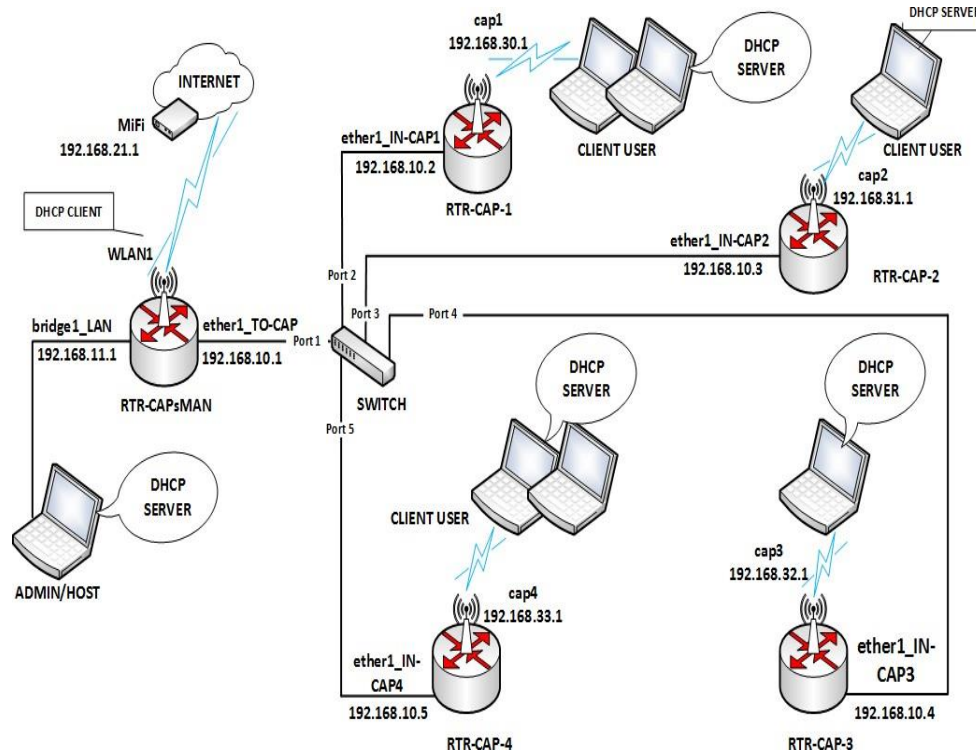


Figure 3. Designing IP Addresses

3 Results and Discussion

The results and discussion are the results of a network system using a proxy and at the 9 Medan State Vocational School. The author conducted trials using data provided by the company. However, before testing, there are several device requirements for the information system.

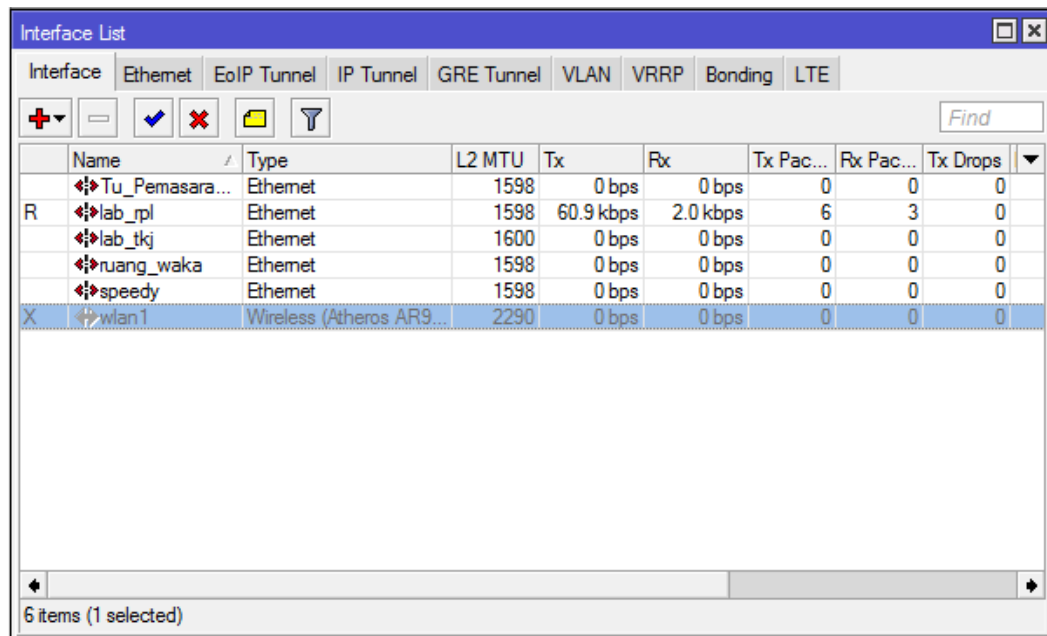
a. Mikrotik Configuration

The configuration made at this stage is adjusted to the topology and needs of each room that has been determined. At the configuration stage the author uses the Mikrotik Router Board 951, as material for configuration and preparation of reports. The default standard IP address on Mikrotik devices has an IP address of 192.168.88.1 and when a computer / laptop is connected to a proxy using an Unshielded Twisted Pair (UTP) cable, the IP address on the computer automatically. we will change, provided that the configuration of the IP address used is dynamic. The following are the configuration stages on the Mikrotik Router Board 915. As for the Winbox Default Configuration view.

Figure 4 Default Configuration View

b. WLAN Interface Configuration 1

Activate the wireless interface on the Mikrotik RB 915. Select the WLAN 1 interface then click the check mark (✓) then the WLAN interface will turn blue indicating that the WLAN interface is active.



Interface	Name	Type	L2 MTU	Tx	Rx	Tx Pac...	Rx Pac...	Tx Drops
	Tu_Pemasara...	Ethernet	1598	0 bps	0 bps	0	0	0
R	lab_rpl	Ethernet	1598	60.9 kbps	2.0 kbps	6	3	0
	lab_tkj	Ethernet	1600	0 bps	0 bps	0	0	0
	ruang_waka	Ethernet	1598	0 bps	0 bps	0	0	0
	speedy	Ethernet	1598	0 bps	0 bps	0	0	0
X	wlan1	Wireless (Atheros AR9...	2290	0 bps	0 bps	0	0	0

Figure 5 Wlan Interface Configuration 1

c. Interface Configuration Either1

Create an Ether1 Local Network IP Address where the IP is the same as the Internet IP. This Mikrotik router can be configured graphically or using CLI (Command Line Interface) commands. The command used to configure the IP address on ether1 is: `ip address add address=192.168.1.2/30 interface=ether1`

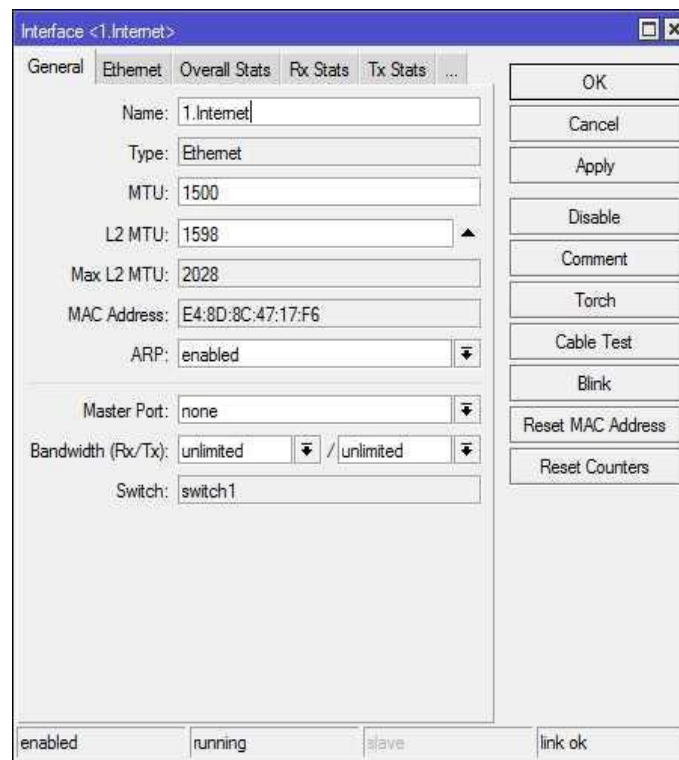


Figure 6 Set Internet IP Address Configuration

d. DNS Server Configuration

The DNS Server functions to map hostnames or domains for sites on the Internet to IP addresses. Based on the scenario, the DNS server used is the ISP's DNS Server with the IP address 192.168.1.1. The command is as follows: `ip dns set servers=192.168.1.1 allow-remote-requests=yes`

Figure 7 DNS Server Configuration

e. Bandwidth Configuration

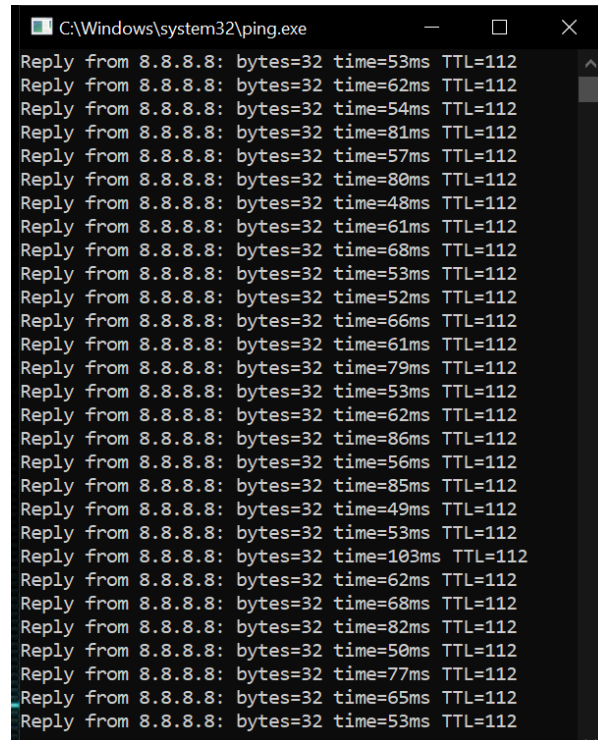
For bandwidth configuration, use the simple queue tool with the single parent method. The concept used is to use the PCQ (Per Connection Queue) parameter. And here for the approximate setting of a maximum of 100 users.

#	Name	Target	Upload Max Limit	Download Max Limit	Packet Marks	Total Max Limit (b/s)
0	LIMIT	10.10.0.0/16	20M	20M		
1	User-2	10.10.20.2	2M	2M		
2	User-3	10.10.20.3	2M	2M		
3	User-4	10.10.20.4	2M	2M		
4	User-5	10.10.20.5	2M	2M		
5	User-6	10.10.20.6	2M	2M		
6	User-7	10.10.20.7	2M	2M		
7	User-8	10.10.20.8	2M	2M		
8	User-9	10.10.20.9	2M	2M		
9	User-10	10.10.20.10	2M	2M		
10	User-11	10.10.20.11	2M	2M		
11	User-12	10.10.20.12	2M	2M		
12	User-13	10.10.20.13	2M	2M		
13	User-14	10.10.20.14	2M	2M		
14	User-15	10.10.20.15	2M	2M		
15	User-16	10.10.20.16	2M	2M		
16	User-17	10.10.20.17	2M	2M		
17	User-18	10.10.20.18	2M	2M		
18	User-19	10.10.20.19	2M	2M		
19	User-20	10.10.20.20	2M	2M		
20	User-21	10.10.20.21	2M	2M		
21	User-22	10.10.20.22	2M	2M		
22	User-23	10.10.20.23	2M	2M		
23	User-24	10.10.20.24	2M	2M		
24	User-25	10.10.20.25	2M	2M		
25	User-26	10.10.20.26	2M	2M		
26	User-27	10.10.20.27	2M	2M		
27	User-28	10.10.20.28	2M	2M		
28	User-29	10.10.20.29	2M	2M		
29	User-30	10.10.20.30	2M	2M		
30	User-31	10.10.20.31	2M	2M		
31	User-32	10.10.20.32	2M	2M		
32	User-33	10.10.20.33	2M	2M		
33	User-34	10.10.20.34	2M	2M		
34	User-35	10.10.20.35	2M	2M		
35	User-36	10.10.20.36	2M	2M		
36	User-37	10.10.20.37	2M	2M		

Figure 8 Bandwidth Configuration

f. Stable Ping Test

As for the network that has been configured below, it will be tested for a stable ping from the network that has been designed. To view can be seen in the picture 7.



```
C:\Windows\system32\ping.exe
Reply from 8.8.8.8: bytes=32 time=53ms TTL=112
Reply from 8.8.8.8: bytes=32 time=62ms TTL=112
Reply from 8.8.8.8: bytes=32 time=54ms TTL=112
Reply from 8.8.8.8: bytes=32 time=81ms TTL=112
Reply from 8.8.8.8: bytes=32 time=57ms TTL=112
Reply from 8.8.8.8: bytes=32 time=80ms TTL=112
Reply from 8.8.8.8: bytes=32 time=48ms TTL=112
Reply from 8.8.8.8: bytes=32 time=61ms TTL=112
Reply from 8.8.8.8: bytes=32 time=68ms TTL=112
Reply from 8.8.8.8: bytes=32 time=53ms TTL=112
Reply from 8.8.8.8: bytes=32 time=52ms TTL=112
Reply from 8.8.8.8: bytes=32 time=66ms TTL=112
Reply from 8.8.8.8: bytes=32 time=61ms TTL=112
Reply from 8.8.8.8: bytes=32 time=79ms TTL=112
Reply from 8.8.8.8: bytes=32 time=53ms TTL=112
Reply from 8.8.8.8: bytes=32 time=62ms TTL=112
Reply from 8.8.8.8: bytes=32 time=86ms TTL=112
Reply from 8.8.8.8: bytes=32 time=56ms TTL=112
Reply from 8.8.8.8: bytes=32 time=85ms TTL=112
Reply from 8.8.8.8: bytes=32 time=49ms TTL=112
Reply from 8.8.8.8: bytes=32 time=53ms TTL=112
Reply from 8.8.8.8: bytes=32 time=103ms TTL=112
Reply from 8.8.8.8: bytes=32 time=62ms TTL=112
Reply from 8.8.8.8: bytes=32 time=68ms TTL=112
Reply from 8.8.8.8: bytes=32 time=82ms TTL=112
Reply from 8.8.8.8: bytes=32 time=50ms TTL=112
Reply from 8.8.8.8: bytes=32 time=77ms TTL=112
Reply from 8.8.8.8: bytes=32 time=65ms TTL=112
Reply from 8.8.8.8: bytes=32 time=53ms TTL=112
```

Figure 9 Tes Ping pada CMD

4. Conclusions

The Implementation Of The Network System Using Mikrotik And At Smk Negeri 9 Medan Has Several Conclusions That Can Be Put Forward, Including: During testing of bandwidth, each user can get bandwidth fairly according to the number of active users. From the results of the tests that have been carried out on the proxy, it runs well and is connected to the client according to the network topology that was previously designed

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