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Implementation of a Local Area Network Using a Mikrotik Router on Sheza Computer

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Abstract
The internet has become a crucial component in supporting the educational process, especially through the development of computer networks in learning environments. A well-organized Local Area Network (LAN) helps create a comfortable and efficient lab space, prevents IP conflicts, and simplifies the process of identifying and fixing technical issues. At LPK Sheza Computer, continuous improvement of network quality and learning infrastructure is a priority. A LAN connects two or more computers within a specific area and must be carefully designed to meet the institution's needs. This research involved data collection through literature studies, interviews with LPK Sheza Computer leadership, and direct observations. The development method used is the Network Development Life Cycle (NDLC), chosen for its effectiveness and efficiency. A well-planned LAN topology-based on the number and type of devices-facilitates easier management and troubleshooting. Key components used in this network include routers, hubs/switches, UTP cables, access points, and computers or laptops. By implementing a structured network system, LPK Sheza Computer aims to support an optimal learning environment and maintain high-quality IT infrastructure.

I. INTRODUCTION

With the progress of technological developments, internet networks in the present era have become a basic necessity, so as long as the use of networks in course education forums must also be implemented properly and correctly for tool management to be more effective and efficient. In this study, we will try to implement networks in course forums that are also useful for adding knowledge to students so that they understand how local area networks work directly. The use of the network is also regulated in the regulation of the Minister of Communications and Information Technology Article 7 paragraph 1 which states that service providers must use the most efficient router. According to the results of Didik Siswanto's research [1] the network is able to provide multihop communication services, the network can also perform self-healing, and if the network on one node is disrupted then the others will remain stable because it uses a mesh network. Research

conducted by M. Fahraz Pratama and friends [2]. The network can be connected as a whole which is implemented in RIP and when exchanging data there is no need for other intermediaries. research conducted by Darmansyah and friends [3], the computer network will be more stable if you use a cable using a proxy with an IP address setting using the Winbox application. Ahmad Tanton and partners [4], using inter-VLAN can increase network performance and can break up broadcasts.

Based on the research above, it has the advantage of using wifi, it has a wide range and is easy to connect, and also has self-healing capabilities but requires a high need for end users because they have to have their own routing configuration capabilities. has the advantage of using RIP (Routing Information Protocol) is the consumption of low memory usage has convenience in terms of configuration and cost but RIP is only suitable for small or medium scale network topologies. Has the advantage of a stable network. Even though it enters the room because it uses cables, the costs are high and the installation is very time-consuming and labor-intensive. Having the advantages of more stable network security increases network performance and has a flexible design, but if the central network is disrupted, everything will be affected.

The problem with Sheza Computer is that it does not yet have a neatly arranged and properly managed local area network network path. many of the students complained about the difficulty in finding equipment to study network proxy. When carrying out computer network practices, there are lots of cables scattered and there is also no fixed IP address configuration for the Local Area Network network, so IP conflicts often occur. To check the condition of the equipment is very difficult because it is not neatly arranged, to detect network errors is also difficult because there is no clear network path.

This study aims to make it easier to manage tools, make network flow more effective in preventing IP conflicts, make it easier for students to learn network proxy, make it easier for students to prepare learning equipment, make it easier for students to learn about good and correct network flow, introduce tool functions on students will be easier to understand, the use of network topology will be clearer, Facilitate maintenance of tools, Facilitate identification if one of the tools is damaged, and can also condition the lab room to be more comfortable.

II. RESEARCH METHODS

2.1 Data Collection

a. Library Studies

Library Studies is a project that uses methods to collect, analyze and categorize data and concentrates on one subject. Additionally, during this research, various sources were used, including journals, books, and pamphlets, all of which were designed to provide information about the subject matter and serve as a starting point for developing theory based on analysis. from the data you collect.

b. Interview

Conducted interviews with the leadership of LPK Sheza Computer Mr. Rosadi, S. Sos. about the problems that occur in the local area network network

c. Observation

Namely, the data collection method by means of direct observation of the problem object taken, the author made direct observations, namely at LPK Sheza Computer about local area network network problems.

2.2 Design Models

The method used is NDLC

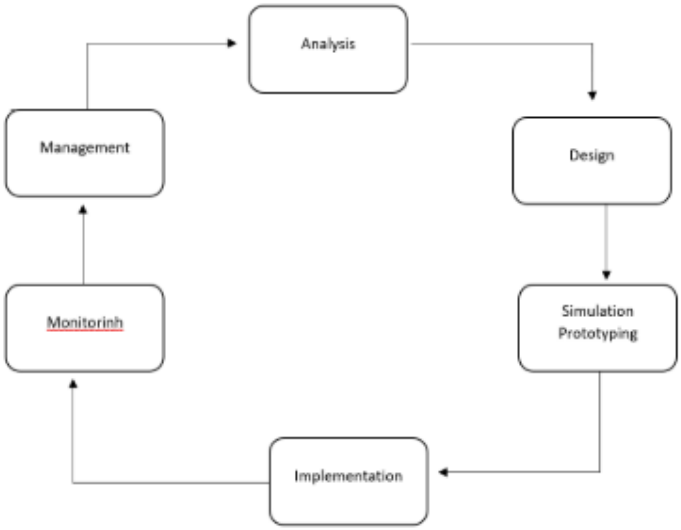

Figure 1. NDLC

The approach uses the NDLC method, which can be used in multiple ways to perform a single task. This is a game of deeds that need to be done. The NDLC method is a strategy for analyzing systems using structural technology to improve system maintenance. NDLC provides a variety of services, including analysis, design, simulation, implementation, and management monitoring.

a. Analysis
The procedure carried out in this case is to identify the individuals in each network being analyzed.

b. Design
Design based on previously obtained information or data; During the design process, you will be able to perform specific web searches, as the nets themselves will serve as a guide for the resulting requirements.

c. Simulation
Simulation with various networks involves simulating the behavior of tools and equipment installed on the system. This is done so that users can observe data processing that occurs on the network that is being used.

d. When this process is carried out, it will generate a wake-up call that is very different from what happened before it was mentioned in the text; consequently, you will be responsible for determining what you do afterward.

e. Monitoring
Monitoring is used to find out if something is wrong or not, so you can make sure that you are doing the right thing when you find something wrong.

f. In this case, management should focus on policy and system implementation to achieve a high level of success while maintaining a low level of reliability.

Shows a diagram of a paper fishbone system to be supplemented in a way that the drawing based on it consists of five entities, such as method, device, identification, network design/design, and test. The entity method includes DHCP snooping and switch port security methods used in this research. device entity, consisting of, two, types of devices, hardware (hardware) and software (software), which are used in this article. Routers, switches, and Mikrotik are examples of hardware that can be used. winbox is the installed moon device. the help entity focuses on identifiable things in this paper, such as data networks and the time of writing. the network designer/design entity focuses on the steps

that need to be taken, such as designing the network topology and configuring routers, switches, and microcontrollers so they can use DHCP snooping and switch methods

III. RESULTS

3.1 Computer Network Flowchart

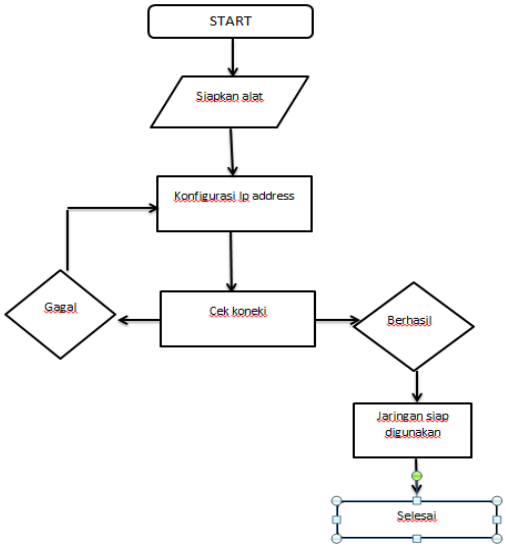

Figure 2. Computer Network Flowchart

3.2 Implementation

The stage of preparing the tools: prepare router equipment, UTP cables, hubs/switches, computers/labtops, crimping pliers.IP address configuration stage: setting up the IP address using the Winbox application. Check the configuration on the new terminal menu, if it doesn't request time out then the network is successful (ready to use)

Discussion

Before configuring the IP address on the Wibox application, make sure the router has reset the configuration.

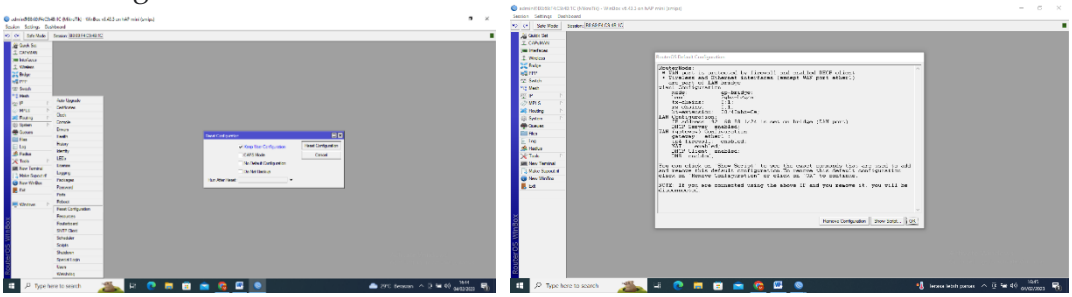

Figure 3. Reset configuration

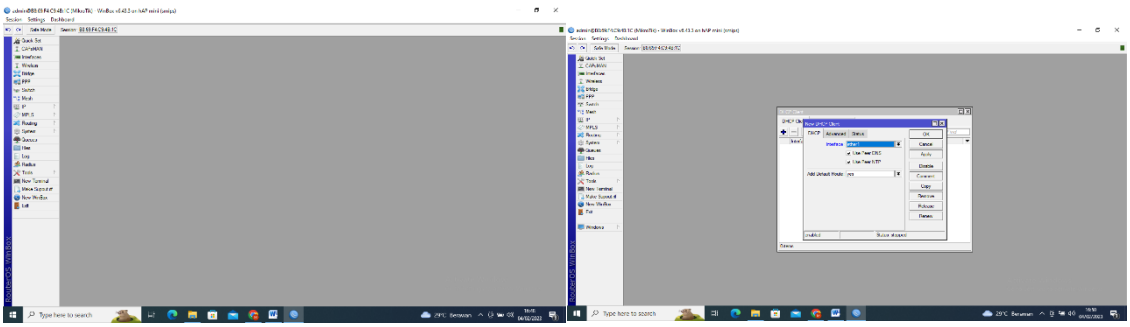

Figure 4. DHCP Client

Changing the Wifi name and also setting up WiFi can be used for all devices

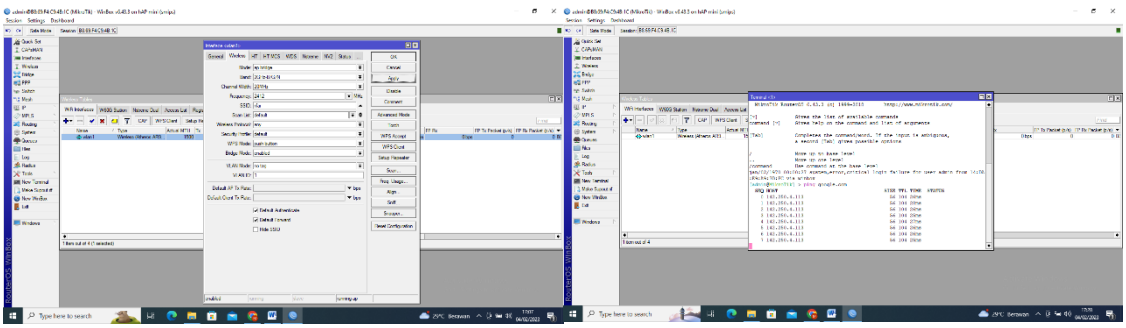

Figure 5. wireless and New Terminal

The results of the study show that the implementation of a Local Area Network (LAN) using a Mikrotik router at Sheza Computer has had a positive impact on network efficiency and stability. The computers were successfully connected in a local network using a star topology, allowing for faster and more integrated communication and collaboration between departments. The Mikrotik router was configured to automatically assign IP addresses, manage bandwidth distribution, and enhance network security through firewall settings.

The network's performance after implementation was stable and optimal. Internal data transfer speeds reached up to 95 Mbps on average, while internet connectivity could be fairly distributed among all users thanks to the applied bandwidth management. The configured firewall feature also successfully restricted access to certain sites and ports, providing an additional layer of network security.

Several technical issues were encountered during the implementation process, such as limited router ports and some devices not being compatible with DHCP settings. However, these issues were resolved by adding an external switch and configuring static IPs for certain devices. In addition, basic training on using Mikrotik was provided to technicians to ensure independent network management moving forward.

Overall, the network implementation proved to be effective in supporting Sheza Computer's operations. The more structured and well-managed system had a direct impact on improving work productivity and user convenience. With the right devices and configuration, this network can continue to be developed to accommodate future needs.

IV. CONCLUSION

The implementation of a Local Area Network using a Mikrotik router at Sheza Computer has proven to be effective in improving the overall efficiency, stability, and security of the company's internal network. Through proper configuration, the router successfully managed IP distribution, bandwidth allocation, and firewall protection, resulting in a more organized and secure networking environment. Despite facing several technical challenges during the setup process, such as hardware limitations and device compatibility, appropriate solutions were implemented to ensure optimal performance. The system now supports smoother communication between departments, fair internet usage, and easier network management. This network setup not only meets the current operational needs of Sheza Computer but also provides a scalable foundation for future expansion. The results indicate that Mikrotik routers are a reliable

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