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Implementation of Virtual Private Network Using Point to Point Tunneling Protocol Mikrotik Router at State Fighter Vocational School Haurgeulis Indramayu

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A R T I C L E I N F O

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ABSTRACT

Using Point To Point Tunneling Protocol (PPTP) Mikrotik Router at SMK Pejuang Negeri Haurgeulis Indramayu Interconnection needs between networks will be needed, especially in an agency that has many branch offices. To facilitate access to communication and data retrieval between offices, a Virtual Private Network (VPN) network is needed. Virtual Private Network (VPN) is a communication technology that allows local networks to be connected to each other via public networks. Data security and data transmission closure from unauthorized access in its transmission on the internet are the main standards in VPNs, so that VPNs always include the main features, namely encryption and tunneling.

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1. INTRODUCTION

The development of the internet in Indonesia is entering a new phase. In 2018, Indonesia was recorded as the sixth country in the world in terms of internet usage. Indonesian people are competing in accessing the internet from just reading information, to using the internet in the world of education. Several schools in Indonesia have implemented the use of the internet to assist teaching and learning activities and help the system run from these school activities.

According to the e-Marketer market research institute, the netter population of the country reached 83.7 million people in 2014. The figure that applies to everyone who accesses the internet at least once every month puts Indonesia in the 6th largest in the world in terms of the number of users. Internet. In 2017, eMarketer estimates that Indonesian netters will reach 112 million people, beating Japan in 5th place, which has slower growth in the number of internet users. Overall, the number of internet users worldwide is projected to reach 3 billion people in 2015. Three years later, in 2018, it is estimated that 3.6 billion people on earth will access the internet at least once every month. Peart said that developing countries such as Indonesia and India still have room

for growth in the number of internet users whose number can reach double digits every year. Above Indonesia, currently the top five internet user countries in the world are China, the United States, India, Brazil, and Japan, respectively." (Kominfo, 2018)

Haurgeulis State Fighter Vocational School is a school that was built in 2012 located in West Indramayu which has 2 majors, namely the Multimedia department and the TBSM (Motorcycle Business Engineering) department.

This school also has 2 buildings that are far apart, between building A which has a teacher's room, administrative room, computer laboratory, cooperative, and class X room, while in building B there is a computer laboratory room, teacher's room, library, administrative room. principal's office, class XI and class XII.

Having two buildings that are far apart, there are often obstacles in exchanging data between building A and building B because so far the Haurgeulis Indramayu State Fighter Vocational School is still manual in exchanging data. That is, by using a flash drive and sharing files, not all staff and teachers understand it, then for how to exchange data for building A and building B using a Virtual Private Network (VPN) network with IndiHome ISP with a bandwidth of 20 Mb.

Based on this problem, the authors analyze and design a Virtual Private Network (VPN) based on Point to Point Tunneling Protocol (PPTP) with the Mikrotik Router Board. A Virtual Private Network (VPN) is a private network that uses a public network infrastructure. VPN is usually used in companies that have several branch offices. By using a VPN network, a company can access each other's local network of each branch office, as if it were still in one Local Area Network (LAN) (kuswanto,2017).

VPN is a secure way to access local area networks that are in range, by using the internet or other public networks to transmit packet data privately, with encryption it is necessary to apply certain technologies so that even though using a common medium, the traffic (traffic) between the remote-site cannot be intercepted easily, nor does it allow other parties to infiltrate undue traffic into the remote-site (putra et al, 2018).

Technological developments have resulted in the need for communication networks to increase. Data exchange which was originally only through hard copies such as typing, handwriting or letters has been replaced with data exchange via soft copy via the internet because of the demands of time and more efficiency. Data communication over the network requires high speed and security. The development of private network technology at this time cannot be separated from the need for security for data transfer. Private networks are considered more efficient because the private network technology is separate from the public network and the data transfer speed is greater. In addition to the security of the private network, it is considered better because it is in a limited scope. (Watrianthos & Nasution, 2018).

The Global White Lotus Foundation is an institution engaged in education which has 9 (nine) school units ranging from PG TK, Islamic Elementary School, Islamic Junior High School, Islamic High School and Vocational School spread across Bekasi and Jakarta. In the data collection process, especially related to student finances, the nine units have school administration system software in their respective school units, this condition makes it difficult for the foundation in the data consolidation process. The data retrieval process is still manual by coming to the location of each school, because if the data is sent via email, besides being less secure, it is also constrained by the limitation of the capacity of the file size that is sent in one delivery using email. (Mufida et al, 2017).

PT Anugerah Tunggal Mandiri is included in the type of holding company where this company has several subsidiaries spread across several places with different types of business. Communication lines or tools for exchanging data and information between the head office and subsidiaries are still manual, such as using internet facilities via email, messenger, fax or telephone line. This causes everyone to still be able to enter the communication network because there are still no restrictions on access rights. For this reason, it is hoped that through VPN technology with RADIUS server authentication,

between the head office and subsidiaries as well as between employees or leaders who are on duty outside the office, a communication network that is easy and secure is guaranteed. (Rosmana & Latifah, 2015).

The advantage with Virtual Private Network (VPN) technology is that it can form a private network between two or more places far enough away by utilizing a public network (internet). Using this system, companies or agencies can save quite a lot of costs besides the security of the data being transferred can be guaranteed. Apart from being a technology to facilitate the flow of data and information transfer, VPN is also important to secure the existence of the data so that it is not misused.(Umaroh et al,2020)

2. RESEARCH METHOD

The need for school activities is quite large, requiring speed and time efficiency which is very important in data transfer or data sharing at SMK Pejuang Negeri Haurgeulis Indramayu, with the existence of an interconnection between internal units in each building can solve problems that have been faced so far. about the slow exchange of information and data exchange that should be done quickly to be known by each teacher and administrative staff without waiting long so that the work becomes more efficient.

Model improvement efforts data information exchange will be carried out with reference to the use of Optimal existing resources include computer equipment, printers and other resources that can be used to system upgrade (Gultom et al,2018)

In dealing with the problem of limited access speed and data security between internal agencies, problem solving can be done using the PPTP (Point to Point Tunneling Protocol) method on the proxy that is already available in each building. In public, the application of this tunneling method is mostly done by IT circles by utilizing existing computer network devices without having to pay expensive fees to rent a VPN which will minimize additional expenses for schools. On a public network using the Point to Point Tunneling Protocol (PPTP) contained in the proxy device, so that a private network is formed that connects several networks using the public network securely.(Sidik et al,2021)

The proposed network topology is a development of the previous topology, because there are additional network configurations for the design of the Metropolitan Area Network, there are slight changes, in this case the topology which was originally a tree after being configured into a bus topology.

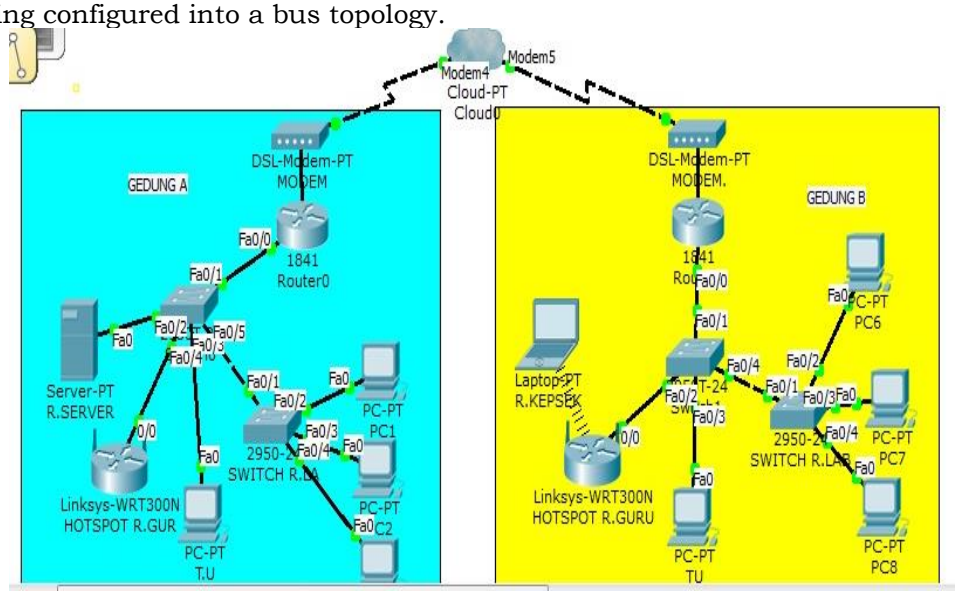

Figure 1. Proposed Network Scheme

Network security is very important in protecting and preventing the actions of other parties such as hackers. Therefore, in the computer network at the Haurgeulis Indramayu State Fighter Vocational School, the existing networks include:

a. On a public network using the Point to Point Tunneling Protocol (PPTP) contained in the proxy device, so that a private network is formed that connects several networks using the public network securely.
b. Users on the local network still have to verify the user and password requested by the server computer.

The configuration that will be carried out for the application of the PPTP tunneling protocol (Point to Point Tunneling Protocol) method will be carried out on each mikrotik router in each building via winbox. The following is the PPTP configuration on the central proxy router where this proxy router functions as a VPN server.

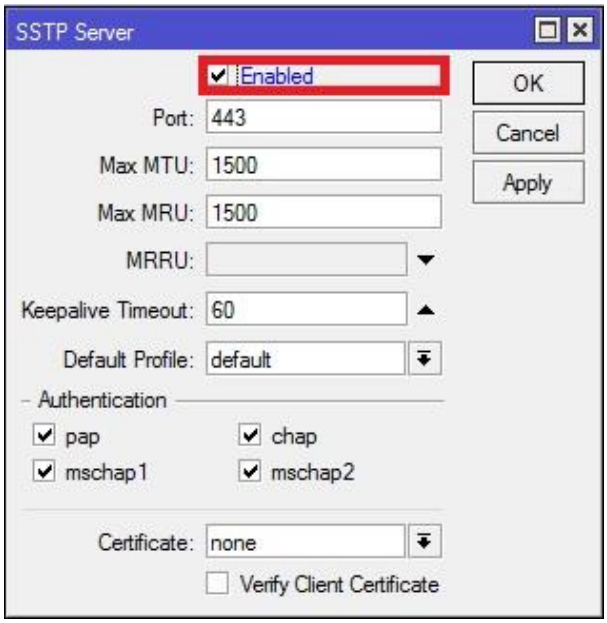

Figure 2. PPTP Configuration

To use the PPTP feature on the proxy router, you must first enable the PPTP server configuration on the proxy which will become the PPTP server. In the picture above is a proxy in building A that was chosen to be a server, enter the PPP menu on the proxy menu bar on the left then select PPTP server on the menu bar then checklist in the enable section.

At this stage the PPTP server on the Mikrotik router building A has been formed, but to access PPTP via dial-up in Mikrotik a username and password are created, which will be entered when making VPN configurations in Mikrotik building B by entering the IP Address and username password that has been set. made in mikrotik.

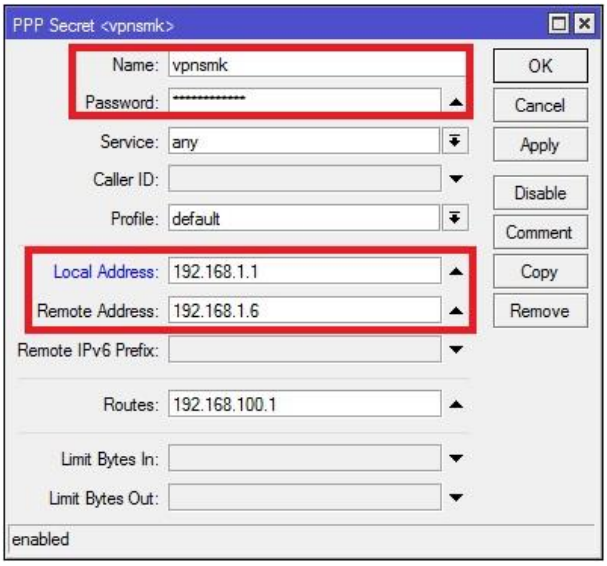

Figure 3. PPTP User Configuration

Select the Secret Tab where this tab contains the configuration for creating a username and password that can access the local network via the internet. In the name column, fill in the name as desired, in the image above it is filled with the name "vpnsmk" and in the password it is filled with "smkpenha2012".

Then the local address column is filled with the Public IP or IP address of the Mikrotik Router located in building A or the server in the remote address column, filled with the IP Address address which will be given to the user if he has successfully accessed PPTP via the internet network.

Configuring the PPTP server on the proxy router in building A which has been completed, to access the PPTP VPN can be done on the mikrotik building B.

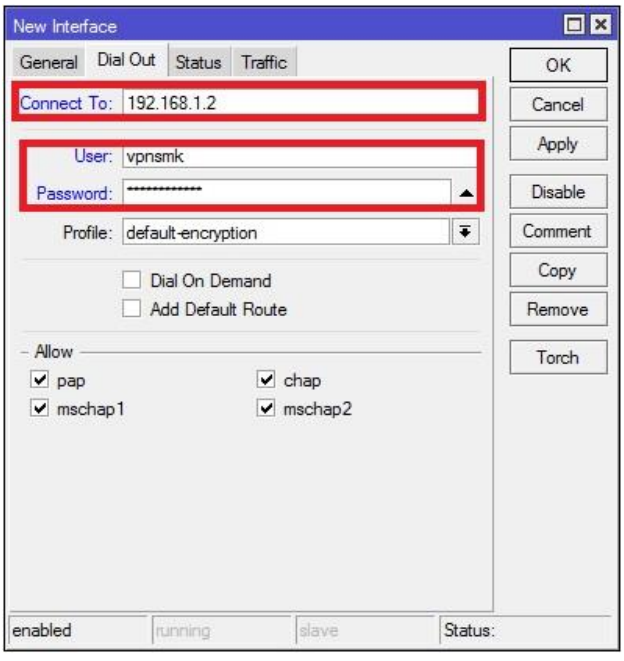

Figure 4. VPN Client Configuration

In the connect to section, fill in the IP address of building A, while for the username and password fields, fill in the username and password that were previously created.

3. RESULTS AND DISCUSSIONS

Network management becomes very important in building a computer network, especially if the network has a very wide scope and also activities or procedures for monitoring, controlling, and maintaining the network (Syaifudin, Asep, Assegaff, Setiawan.2020)

In the application of the Tunneling Protocol method, it is very helpful for network administrators to more easily monitor, monitor, computer networks that are running and data retrieval without having to make visits between buildings. especially by using The Secure Socket Tunneling Protocol (SSTP) protocol can make communication between several networks through a tunnel that passes through the internet network with safe (Farly, Kaseger Arthur Najoan, Xaverius B N Lumenta, Arie S M, 2017).

Network testing that the author did using Cisco Packet Tracer software. Using 1 server and router devices and several users. In the initial network testing, the author uses Cisco Packet Tracer software simulation. The following is an overview of the initial network simulation. After the implementation period is considered sufficient, then researchers carry out an evaluation of the results of implementation (action taking) the author evaluates the results of the network performance test (Bobanto,et all. 2015).

Packet Tracer is a simulator of Cisco network tools that is often used as a medium of learning and training, and also in the field of computer network simulation research. This program is created by Cisco Systems and is free with the aim of understanding the principles of computer networking and also building skills in the field of Cisco networking tools.(

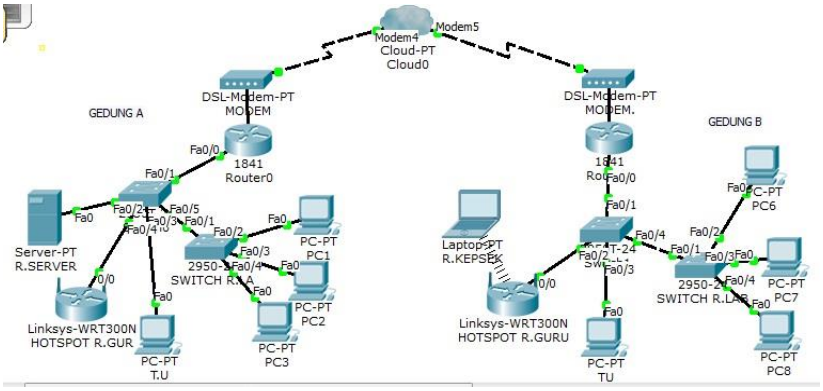

Figure 5. Initial Network Simulation

The simulation test uses Cisco Packet Tracer software which has used VPN network services with 2 mikrotik routers.

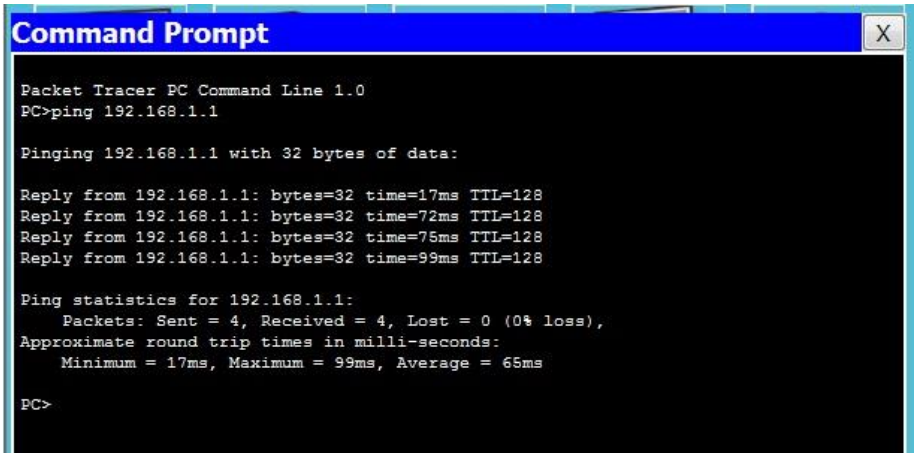

Figure 6. Ping result from PC TU building B to Server

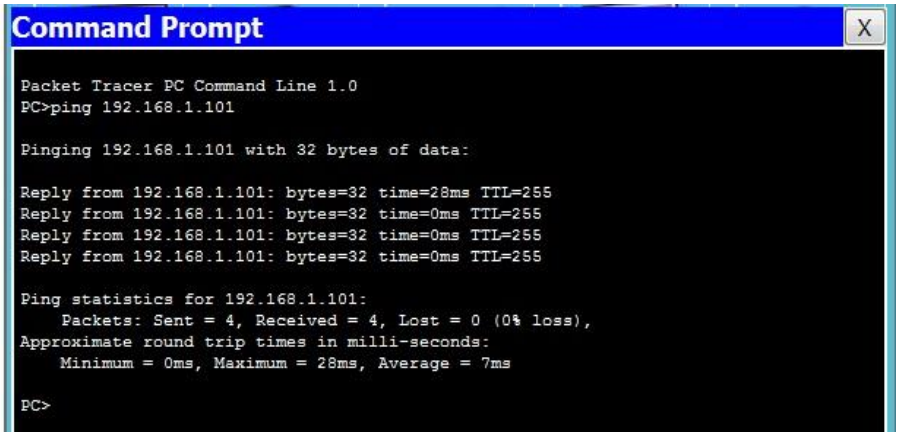

Figure 7. Ping result of computer to router

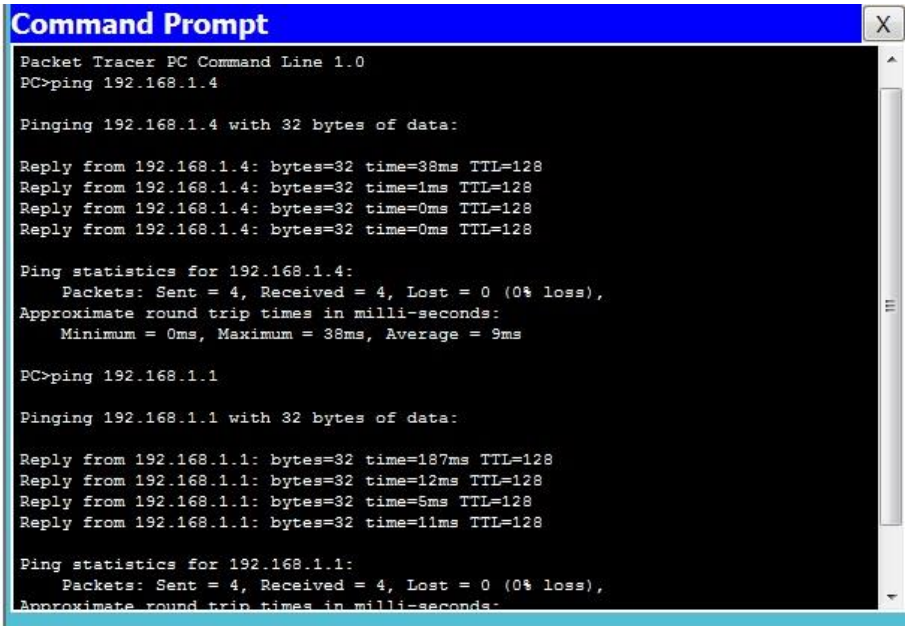

Figure 8. Ping results between PCs in each building

4. CONCLUSION

Provide After studying and analyzing the network using a VPN, the author gives some conclusions about the Virtual Private Network (VPN) network as follows: Virtual Private Network (VPN) is a virtual network that combines two LANs (Local Area Network) or more even though the distance between the connected networks is very far. Virtual Private Network (VPN) uses point to point tunneling protocol (PPTP) as one of the protocols used to securely connect networks using public networks. Virtual Private Network (VPN) has a high level of security because it can make a public network (the internet) into a private network.

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