BUILDING VPN NETWORK IN BADAN PENDAPATAN DAERAH (BAPENDA) WEST JAVA PROVINCE

Rizki Agusti Ghofur[1], Iskandar Ikbal, S.T., M.Kom[2]

Informatics Engineering Program
Faculty of Engineering and Computer Science. Indonesian Computer University
Jl. Dipatiukur No. 112-116 Bandung. 40132
E-mail : rizkiagusti@gmail.com[1] , iskandar.ikbal@email.unikom.ac.id[2]

ABSTRACT

This research is titled "Building VPN Network in Badan Pendapatan Daerah (BAPENDA) West Java Province". The objective of this research was to optimalize the access of Archival Information System Application (SIMKA) and minimalize the exploitation of SIMKA server. The system development method used in this reseacrh is the PPDIOO method, by analyzing the network problems that occur in the form of difficulties in accessing applications. The problems occur because of the internet bandwidth is used outside of work and the easiness to generally access the Archival Information System Application (SIMKA) BAPENDA JABAR that resulting the exploitation of applications and networks. Based on the problems that occur, VPN networks are created for Archival Information System applications (SIMKA) using the PPTP protocol. Several stages in building a VPN network include Configuration Profile, PPTP Server Configuration, Account Configuration, TCP PPTP In Filter Rules Configuration, GRE PPTP Out Rules Filter Configuration, GRE PPTP In Rules Filter Configuration, GRE PPTP Out Rules Filter Configuration and GRE PPTP Filter Rules Configuration Forward. The results show that, with the creation of a VPN network for Archival Information System applications (SIMKA) using the PPTP protocol, can maximize access to Archival Information System applications (SIMKA) and minimize exploitation of SIMKA servers.

Keywords: Exploitation, PPDIOO, PPTP, Server, VPN.

1. INTRODUCTION

Revenue Agency Area of West Java (BAPENDA JABAR) is a device that has a function area diantaranaya organizing income and public service, including secretarial, tax planning and development, a non-tax, controlling and coaching. BAPENDA JABAR manages the archives relating to the taxation of which motor vehicle Tax (PKB) and Bea behind the Name of motor vehicles (BBNKB) around the West Java, BAPENDA JABAR has 34 branches of Revenue Service area (CPPD) in each The city and County to serve the community in terms of Motor Vehicle Taxation (PKB).

Based on interviews with Mr. Husni Kamil Asep s. current Sos BAPENDA JABAR had a system that handles applications archives PKB and BBNKB i.e. Archival information systems (SIMKA), but from observations in the field and interviews with Mr. Asep Husni Kamil s. Sos found few obstacles experienced, not relative to network so it is difficult, because applications open SIMKA still a large number of employees using the internet services outside of work that resulted in the not achieve the target reporting archive PKB and BBNKB, proved to be based on the data List Rekaputilasi evaluation results Over a Motor Vehicle Archive Media West Java province from January until March 2018 there are only 11 branches that meet targets and 23 the branch does not meet the target reporting archive.

Based on observations in the field and interviews with Mr. Husni Kamil Asep s. Sos, the present application is accessed by SIMKA 34 branches with public internet access resulting in exploitation that leads directly towards the server, based on the proven on 4 March 2018 317 exploitation occurs brute force against the server SIMKA and based on data results with sniffing Wireshark tools techniques, is still as easy application SIMKA being exploited this can threaten data therefore needed as well will a network that can protect data, security is assured because the archive is a valuable asset and includes a wealth of countries contained in the legislation of the Republic of Indonesia Number 43-year 2009 about the Archives.

To address the problem of data security in communication on the public network (public network/internet) as well as maximizing the distribution of the data packet, Virtual Private Network (VPN) can be a solution. Some of the research on Virtual Private Network (VPN) has done before. Research that has been done by Heru Supriyono, Jisnu Adi Supardi Agus Widjaya, and entitled "application of Network Virtual Private Network for Secure Data Communications For PT. Tirta Mega natural", producing research that focuses on data security. [6] In another study conducted by Dhio S with the title "implementation of Virtual

Private Network in the area of financial management information system the Government of Riau Province", producing research that focuses on data security and restrictions access to the network. [7] based on the background of the issue above, the author intends to take this final task topic under the title "**BUILDING VPN NETWORK IN BADAN PENDAPATAN DAERAH (BAPENDA) WEST JAVA PROVINCE**".

The expected goal will be achieved in this research are:

1. Maximize your Access Application SIMKA.
2. Minimize the exploitation against Server SIMKA.

2. RESEARCH CONTENT

2.1 Theoretical Basis

2.1.1 Computer Network

The history of the network or the computer network originating from time-sharing networks, namely the "series" terminal connected to a central computer called a mainframe. Example time-sharing networks is IBM's system network architecture (SNA) and digital network architecture.

Then a small-scale computer called the Personal Computer or PC is starting to shift the mainframe computers. [13]

2.1.2 Topology

With regard to the LAN area network limited. Generally, a LAN can be developed to support the data transfer rate is very high. There are 4 basic LAN topology (which is sometimes used also to MAN, WAN, and Internet) namely Bus, Ring, Mesh, Start. [15]

2.1.2 Internet

The term comes from the word internet internetworking. Internetworking itself could be interpreted as a network from the network, which means a collection of sensor networks that connects computers from different systems. So, in short, we can say that the internet is a combination of several different types of computer networks which are interconnected and linked to each other. [13]

2.1.3 IP Address

The IP address is formed by a set of binary numbers all 32 bits, which is divided into 4 parts. Each section length is 8 bits. The IP address is the introduction of every host on the Internet. It means not allowed the existence of another host (which is affiliated to the internet) using the same IP address. [13]

2.1.3 VPN

Virtual Private Network (VPN) is a computer network used technology to connect from some Local Area Network a geographically-separated location into a virtual LAN.

VPN use public communications media (like the internet) to connect the area to warn them. Data via the public network will be encrypted so that guaranteed its security and other users cannot see the contents.

The current VPN is widely used by large companies, educational institutions, and Government instance. The cost of a VPN is far cheaper than the costs for the leased line. Biasayanya VPN used by companies to connect the headquarters and branch offices. [13]

2.1.3 PPTP

Virtual Private Network (VPN) is a computer networking technology that is used to combine multiple LAN that are geographically separated location (far) into a virtual LAN, PPTP is a network protocol developed by Microsoft and Cisco that allows secure data transfer from server to remote clients instances by creating a private VPN via TCP/IP. [13]

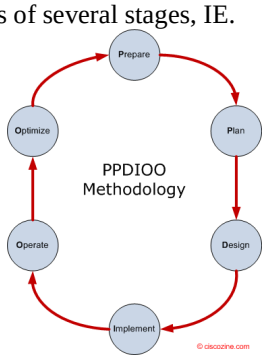
2.1.3 Firewall

Firewall or firewall is a network system designed to control the transmission of data where the firewall can allow or block packet data in or out based on Security vulnerability. [10]

A firewall can be a useful package through which, based on rules or rules made by Admins. So, whether or not a reliable firewall in the end strongly influenced by ability/skill an admin in making the rules. [15]

2.2 Methodology Research

This research method using the method Prepare, Plan, Design, Implement, Operate, and Optimize (PPDIOO) Network Lifecycle such as in Figure 1, which consists of several stages, IE.



Gambar 1. Metod PPDIOO

1. Prepare
   In the model of development system starts from the first phase of the PPDIOO phase prepare. On this phase Establishes the Organization/institution requirements, network development strategy proposes a concept of network architecture by identifying the

utilization of technologies that can provide support to the implementation of the draft the best architecture.

2. Plan
   For the next stage is the stage of a plan involving the identification of initial objectives based on network requirements, facilities, user needs, and so on.

3. Design
   In the design, stages are doing the design based on the analysis that has been done.

4. Implement
   The next stage is the stage of implementation, at this stage, it does application based on the analysis and design of VPN.

5. Operate
   In this stage is the process of testing, conduct testing using parameters that are specified against the VPN and components in order to make sure supporters are already well underway and right and already answered problems have been formulated.

6. Optimize
   This stage is the stage of evaluation of the system that has been running so that the system can be run well.

2.3 Results and Discussion

2.3.1 Preparation (Prepare)

Prepare acts to know and understand more about the object to be examined. These stages describe the process of analysis and design implementation of VPN (Virtual Private Network) using Mikrotik Router. Prior to the implementation and design of the system, first implemented a basic needs analysis system to be built.

2.3.2 Planning (Plan)

Plana planning phase that aims to identify and observe what is involved in a system. The plan aims to gain an overall understanding of the system to be built based on input from external parties and also the experience of analysis with an interest in the system.

1. Problem analysis

Revenue Agency of West Java Province (BAPENDA Jabar) located at Jl. Soekarno Hatta 528, Sekejati, Buahbatu, Bandung, West Java. Jabar BAPENDA the regional organizations which have the function among them implementation of revenue and public services, including secretarial, planning and development taxes, non-taxes, control, and guidance. BAPENDA Jabar manages archives relating to taxation such as vehicle tax (PKB) and Customs of Vehicle (BBNKB) and has 34 CPPD in each district and throughout the city of West Java. BAPENDA Jabar has a system application that handles archival PKB AND BBNKB namely Information Systems Filing (SIMKA) but found some of the constraints experienced by them unstable networks used so difficult to open the application SIMKA, because there are many employees use Internet services outside of work which has resulted in the achievement of targets PKB and BBNKB archive reporting. SIMKA applications accessed by 34 branches with public internet access which resulted in the exploitation of which leads directly to the server it can threaten data. The constraints occur by exposure to the above are as follows SIMKA applications accessed by 34 branches with public internet access which resulted in the exploitation of which leads directly to the server it can threaten data. The constraints occur by exposure to the above are as follows SIMKA applications accessed by 34 branches with public internet access which resulted in the exploitation of which leads directly to the server it can threaten data. The constraints occur by exposure to the above are as follows

a. The difficulty of accessing applications due to internet bandwidth use interests outside of work.
b. Still easy Archival Information System (SIMKA) BAPENDA publicly accessible JABAR that could lead to the exploitation of the application and the network.

2. Network analysis

Network analysis that will be discussed in this section includes Network Topology Analysis, Analysis of subnetting, analysis of Internet Protocol.

a. Network Topology Analysis

Here is a network topology application SIMKA (Archival Information System) which is running Revenue Agency of West Java Province. The following SIMKA network topology in Figure 2.

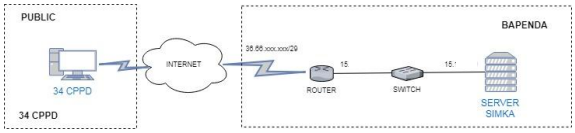


Figure 2. Sekema Network Now

b. analysis Subnetting

Subnetting Analysis is to analyze the technique breaks down a large network into smaller networks by sacrificing bits Host ID on a network subnet mask to be used as a new ID. Subnetting techniques that are used in applications SIMKA in (BAPENDA) West Java Province. can be seen in Table 1.

Table 1. analysis Subnetting

IP	Information
36.66.xxx.xxx/29	As a Public IP
15.xxx.xxx.0 / 24	As used Subnet Servers

c. Internet Protocol Analysis

In this study, analysis of the IP (Internet Protocol) application SIMKA in (BAPENDA) West Java Province will be divided into several parts, namely the Public IP and Private IP used by the Board of Revenue (BAPENDA) West Java Province. Can be seen in Tables 2 and 3.

Table 2. Public IP

Information	IP
address	36.66.xxx.xxx
netmask	255.255.255.248
Information	IP
Wild card	0.0.0.7
network	36.66.xxx.xxx
broadcast	36.66.xxx.xxx
HostMin	36.66.xxx.xxx
HostMax	36.66.xxx.xxx

Table 3. Private IP

Information	IP
address	15.xxx.xxx.xxx
netmask	255.255.255.0
Wild card	0.0.0.255
network	15.xxx.xxx.xxx
broadcast	15.xxx.xxx.xxx
HostMin	15.xxx.xxx.xxx
HostMax	15.xxx.xxx.xxx
server	15.xxx.xxx.xxx

2.3.3 Design (Design)

The design is a process that describes how a system is built to meet the requirements analysis phase.

1. Design of Network Topology

VPN Topology Overview Network Development In Regional Revenue Agency (BAPENDA) West Java Province. The following globally VPN design, illustrated in Figure 3.

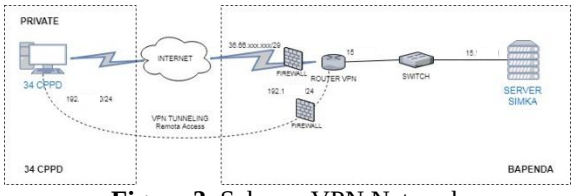


Figure 3. Sekema VPN Network

2. designing VPN

In this study, the design of a VPN (Virtual Private Network) on the application SIMKA in (BAPENDA) West Java Province will be divided into several parts, namely the implementation and protocol type used by the Board of Revenue (BAPENDA) West Java Province.

a. Types of VPN implementations

Judging from the type of VPN implementations that exist, in this study are included in the category of Remota Access VPN.

b. Used VPN protocol

In this study, the protocol used is the Point-to-Point Tunneling Protocol. PPTP communication using the TCP port 1723 and using the IP Protocol 47 (GRE) for data packet encapsulation. PPTP supports network security protocols for authentication purposes. Some of them are PAP, CHAP, MS-CHAP, MSCHAP2.

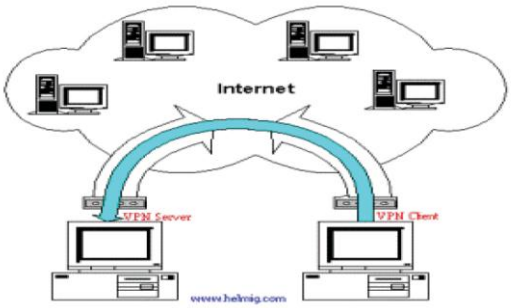


Figure 4. Remota groove PPTP VPN Access

4. Design Subnetting

Regional Revenue Agency (BAPENDA) of West Java province also has 34 branches. Therefore, subnetting techniques used to facilitate the distribution of the VPN network applications SIMKA in (BAPENDA) West Java Province. can be seen in Table 4.

Table 4. Design Subnetting

IP	Information
36.66.xxx.xxx/29	As a Public IP
15.xxx.xxx.xxx/24	As used Subnet Servers
192.xxx.xxx.0 / 24	As a Local Subnet Addres VPN
192.xxx.xxx.0 / 24	As Subnet VPN Remote Address

5. Designing an IP (Internet Protocol)

In this study, the design of the IP (Internet Protocol) application SIMKA in (BAPENDA) West Java Province will be divided into several parts, namely the Public IP and Private IP used by the Board of Revenue (BAPENDA) West Java Province.

a. Public IP

Designing Public IP used in applications SIMKA in (BAPENDA) West Java Province can be seen in Table 5.

Table 5. Public IP Design

Information	IP
address	36.66.xxx.xxx
netmask	255.255.255.248
Information	IP
Wild card	0.0.0.7
network	36.66.xxx.xxx
broadcast	36.66.xxx.xxx
HostMin	36.66.xxx.xxx
HostMax	36.66.xxx.xxx

b. Private IP
Designing private IP digunkan on SIMKA application in (BAPENDA) West Java Province can be seen in Table 6, Table 7 and Table 8.

Table 6. Designing IP Private Server

Information	IP
address	15.xxx.xxx.xxx
netmask	255.255.255.0
Wild card	0.0.0.255
network	15.xxx.xxx.xxx
broadcast	15.xxx.xxx.xxx
HostMin	15.xxx.xxx.xxx
HostMax	15.xxx.xxx.xxx
server	15.xxx.xxx.xxx

Table 7. Designing VPN Private IP Local Address

Information	IP
address	192.xxx.xxx.0
netmask	255.255.255.0
Wild card	0.0.0.255
network	192.xxx.xxx.xxx
broadcast	192.xxx.xxx.xxx
HostMin	192.xxx.xxx.xxx
HostMax	192.xxx.xxx.xxx

Table 8. Design Private IP VPN Remote Address

Information	IP
address	192.xxx.xxx.xxx
netmask	255.255.255.0
Wild card	0.0.0.255
network	192.xxx.xxx.xxx
broadcast	192.xxx.xxx.xxx
HostMin	192.xxx.xxx.xxx
HostMax	192.xxx.xxx.xxx

6. designing Firewall
The firewall serves to increase network security by determining what data packets can enter or exit the network. To determine which package will be accepted (accept) or removed (drop), the firewall will examine the header of an IP packet.

To provide security over VPN then be made Filter Rule, as follows.

a. Building a PPTP Tunnel Line Filter Rules
In this stage formed a tunnel path PPTP protocol is TCP port 1723 and protocol. Where the private tunnel formation in the public network between the client and the server.



Figure 5. Firewall grooves PPTP Tunnel

b. Build Filter Rules Encryption and encapsulated in data packets
In this stage of execution of encryption and encapsulation of the data packets within the tunnel formed between the server and client or client to the server by using the GRE protocol.

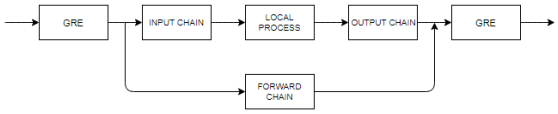


Figure 6. Encryption Firewall grooves and Encapsulation

c. Displays Message Request Timed Out.
Filter These rules blocking ICMP packets protocol data from the WAN into the router and displays the message Request Timed Out to the sender of the packet.



Figure 7. Filter Rules Drop WAN ICMP

2.3.4 Implementation (Implementation)

Implementation of the system is a network of the translation stage design based on the analysis of network and application needs of the real situation.

1. Implementation of VPN and Firewall Configuration

VPN Configuration is done by using a proxy, the proxy used is routerboard 2011uias-rm, where the VPN configuration using the Winbox as remote software. Following the implementation of VPN and firewall configuration on the proxy routerboard 2011uias-rm can be seen in Table 9.

Table 9. Implementation of VPN and Firewall Configuration

Name	Information
configuration Profile	Configuration profiles are used to create a set of DNS.
Configuring PPTP Server	Configuring PPTP Server is used to create a VPN using the PPTP protocol.
Account	Account configuration is

configuration	used to create a username and password for the VPN user friendly.
Filter Rules Configuration TCP PPTP In	Configuring TCP PPTP In Filter Rules are used to allow data packets that enter the router in the form of TCP packets that mengunkan port 1723.
Configuring PPTP GRE Filter Rules Out	Configuring PPTP Filter Rules Out TCP is used to allow data packets out of router protocols such as TCP.
Configuring PPTP GRE Filter Rules In	Configuring PPTP GRE In Filter Rules are used to allow data packets that enter the router such as the GRE protocol.
Configuring PPTP GRE Filter Rules Out	Configuring PPTP GRE Filter Rules Out is used to allow data packets out of the router such as the GRE protocol.
Filter Rules Configuration PPTP GRE Forward	Configuring PPTP GRE Forward Filter Rules are used to monitor the data packets through the router such as the GRE protocol.
Configuration Rules Filter ICMP	Configuration Filter Rules ICMP is used to block the data packets to the router in the form of ICMP protocol.
Drop Filter Rules Configuration Access	Drop Filter Configuration Access Rules are used to block the data packets to the router.
NAT configuration Masqurade Server	NAT configuration Masqurade Server is used to provide internet access to the server.
NAT configuration Masqurade	Masqurade VPN NAT configuration is used to redirect all access to ppp.
HTTP Proxy Configuration WEB	WEB Configuration HTTP proxy is used to direct the entire access port 80 to port 3192.
WEB HTTPS Proxy Configuration	WEB HTTPS Proxy Configuration is used to direct the entire access port 443 to port 3192.
UDP DNS Proxy Configuration	Configuring DNS Proxy UDP is used to redirect all access to port 53 UDP protocol to the Local DNS.
DNS configuration TCP Proxy	TCP Proxy DNS configuration is used to direct the entire access to TCP port 53 to the local DNS.

2.3.5 Operate

Operateis the cornerstone that aims to find errors or deficiencies in the network system being tested. System testing is to determine the performance of the system that has been made in accordance with the purpose of system design.

1. testing Systems

In the testing phase of the VPN system at the Regional Revenue Agency (BAPENDA) West Java Province, will be tested to find errors and deficiencies in the network is built. For testing using the testing balckbox.

a. The test scenario

In the test scenario is focused on the design and performasi suitability of VPN. Scenario testing can be seen in Table 10.

Table 14. Testing scenarios VPN

name Testing	Sekenrio Testing
pengkoneksian VPN	Choosing the type of dial-up VPN connections
	VPN connection type
	Fill in an address and the name of the dial-up
	Incorporating VPN account username and password
	Calling DNS Server on the browser in the form of simka.local
ping Server	Open a command prompt
	Ping of the IP Server
	Ping to the DNS Server
	Ping the DNS terhdap google
	Ping to www.google.com domain
ping Router	Open a command prompt
	Ping of the IP address 36.66.xxx.xxx
VPN security	Open an app simka
	Fill in your username and password
	login
	Perform data input
	Reading the application process with the functions action wireshark

b. Test result

VPN testing the Regional Revenue Agency (BAPENDA) West Java Province is divided

into several stages, VPN test results are shown in Table 11.

Table 11. Testing scenarios VPN

name Testing	**Sekenrio Testing**	**Expected results**	Test result
pengkoneksian VPN	Choosing the type of dial-up VPN connections	Appears connection type	[√] be accepted [ ] rejected
	VPN connection type	Filling the display appears address address	[√] be accepted [ ] rejected
	Fill in an address and the name of the dial-up	Filling the display appears username and password	[√] be accepted [ ] rejected
	Incorporating VPN account username and password	VPN can be connected tehadap	[√] be accepted [ ] rejected
	Calling DNS Server on the browser in the form of simka.local	Display the application log simka	[√] be accepted [ ] rejected
ping Server	Open a command prompt	Command Prompt Appears	[√] be accepted [ ] rejected
	Ping of the IP Server	Bring up view reply	[√] be accepted [ ] rejected
	Ping to the DNS Server	Bring up view reply	[√] be accepted [ ] rejected
	Ping the DNS terhdap google	Bring up the display request time out	[√] be accepted [ ] rejected
	Ping to www.google.com domain	Bring up the display can not be meneumkan host	[√] be accepted [ ] rejected
ping Router	Open a command prompt	Command Prompt Appears	[√] be accepted [ ] rejected
	Ping of the IP address 36.66.xxx.xxxx	Bring up the display request time out	[√] be accepted [ ] rejected
VPN security	Open an app simka	Display the application log simka	[√] be accepted [ ] rejected
	Fill in your username and password	Appears dashboard display simka	[√] be accepted [ ] rejected
	login	Can be stored scan data	[√] be accepted [ ] rejected
	Perform data input	Login process and can scan data input ter encryption	[√] be accepted [ ] rejected
	Reading the application process with the functions action wireshark	Expected results	[√] received [ ] rejected

3. CLOSING

Conclusions and suggestions contain the results obtained after the analysis, design, and implementation of VPN network design was built and has been developed, as well as suggestions that will provide important records and possible improvements that need to be done to further the development of VPN Network.

3.1 Conclusion

Based on the results of the discussion in the previous chapter, the conclusions obtained from the analysis, design, and implementation of Network VPN is a VPN network development in the Board of Revenue (BAPENDA) West Java Province on the application SIMKA can help maximize application access SIMKA and to minimize the exploitation of the server SIMKA ,

3.1 Suggestions

At the suggestion, as for VPN network construction in BAPENDA Jabar is in the future can use the system to the computer remotely at any branch without the need to place the branch and in the future could use a more secure system and more leverage in terms of the transmission of data packets.

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