

## ***DESIGN OF THREE CLASS INTERNET PROTOCOL ROUTING MODEL BASED ON LINUX COMMAND LINE INTERFACE***

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### ***ABSTRACT***

*The world of information technology is currently experiencing very rapid development, especially in internet technology. The Internet itself is a form of utilization of a computer network system, a computer network system consisting of a group of computer systems and other computing hardware linked together through communication channels to facilitate communication and resource sharing among various users. TCP / IP is a standard protocol that is applied to the internet network. The existence of a router in a TCP/IP network is very important, this is due to the large number of hosts and the differences in the devices used on a TCP/IP network. Router is a computer network device that is used to forward data packets from one network to another, both within the scope of LAN and WAN networks. As a result, a routing mechanism is needed that can integrate many users with a high degree of flexibility. Routing is generally divided into two categories, namely static routing and dynamic routing. Static routing is a routing mechanism that depends on the routing table with manual configuration while dynamic routing is a routing mechanism where the routing table exchange between routers on the network is carried out dynamically. Routing in the world of information technology (IT) is part of how to improve network performance. Routing is a process to choose the path (path) traversed by the packet. Routing itself is very instrumental in building a network, be it LAN or WAN. Currently the use of routing in a network is something that needs to be taken into account in a company. Today's companies that have business processes in the IT sector are very dependent on network availability. Network reliability is the main point in the operation of the system. An adequate and reliable network infrastructure is very much needed by the company, especially regarding the company's electability. Companies that have large-scale networks need several techniques so that the network can work optimally and reliably in overcoming various problems that arise, including network connectivity that is still not stable and link redundancy has not been implemented as a backup path to overcome network failures if interference occurs. alternative network paths that are used to increase network availability, so that if there is a broken link in a network, the data path can still be connected without affecting the connectivity of devices on the network .*

**Keywords :** *Routing Design, Routing Model, Network, Internet.*

### **1. Introduction**

The world of information technology is currently experiencing very rapid development, especially in internet technology. The Internet itself is a form of utilization of a computer network system, a computer network system consisting of a group of computer systems and other computing hardware linked together through communication channels to facilitate communication and resource sharing among various users. TCP / IP is a standard protocol that is applied to the internet network (Ruiz, et al., 2019; Sert, et al., 2018). The existence of a router in a TCP/IP network is very important, this is due to the large number of hosts and the differences in the devices used on a TCP/IP network. Router is a computer network device that is used to forward data packets from one network to another, both within the scope of LAN and WAN networks (Sahoo, et al., 2019; Qadir, et al., 2018). As a result, a routing mechanism is needed that can integrate many users with a high degree of flexibility. Routing is generally divided into two categories, namely static routing and dynamic routing. Static routing is a routing mechanism that depends on the routing table with manual configuration while dynamic routing is a routing mechanism where the routing table exchange between routers on the network is carried out dynamically. Routing in the world of information technology (IT) is part of how to improve network performance. Routing is a process to choose the path (path) traversed by the packet. Routing itself is very instrumental in building a network, be it LAN or WAN (Lakew, et al., 2020).

Currently the use of routing in a network is something that needs to be taken into account in a company. Today's companies that have business processes in the IT sector are very dependent on network availability (Viriyasitavat, et al., 2019). Network reliability is the main point in the operation of the system. An adequate and reliable network infrastructure is very much needed by the company, especially regarding the company's electability (Gaur, et al., 2021; Dehghani, et al., 021). Companies that have large-scale networks need several techniques so that the network can work optimally and reliably in overcoming various problems that arise, including network connectivity that is still not stable and link redundancy has not been implemented as a backup path to overcome network failures if interference occurs. alternative network paths that are used to increase network availability, so that if in a network there is a broken link, the data path can still be connected without affecting the connectivity of devices on the network. Based on this background, it encourages the author to further investigate the determination of a good network routing model to improve network effectiveness and performance, analyzed to determine the best routing.

A system is a collection of objects such as people, resources, concepts, and procedures that are intended to perform an identifiable function or to serve a purpose. For example, a university is a system of students, faculty, staff, administration, buildings, equipment, ideas, and rules for the purpose of educating students, producing research, and providing services to the community. Etymologically, the system comes from the Greek *Sustema* or Latin *Systema*. Meanwhile, in terms of terminology, the system is something that is formed from a combination of many components that work together into a single unit for a particular purpose. That way, every system will have several elements that make up No system that stands with only one component The term system is commonly used in various aspects. The system consists of parts that each have different tasks that complement each other. All of its elements form a 'connection' to work together in a certain process. This will make a goal can be achieved as planned. If there is one component that does not work properly, it will affect the entire system. LAN is a number of units that are connected together in a certain area that is not so large, such as in one office or building. Currently, most LANs based on IEEE 802.3 Ethernet technology use switch devices, which have data transfer rates of 10, 100, or 1000 Mbit/s (Hafsi, et al., 2021). In addition to Ethernet technology, currently 802.11b technology or commonly called Wi-Fi is also often used to form LANs (Srivastave, et al., 2018). In a LAN, each node or group has its own computing power and can also access the resources on the LAN according to the permissions that have been set. These resources can be information or devices such as printers (Murakami, et al., 2018). On a LAN, a user can also communicate with other users using the appropriate application MAN is a network that connects many LANs in a city using high transfer speeds. Usually MAN has a range of about 10 to 50 km. MAN is a development of LAN which usually already has server facilities. MAN may very well be run by an organization, but it is used by many individuals and most have provided internet services for 2iter networks or LAN. Wide Area Network is an integrated network that covers a large area, for example, an integrated network between regions, cities and even countries. WAN can also be defined as a single network that requires routers and two-item communication channels. WAN is used to connect one 2iter network with another 2iter network, so that they can exchange information with each other (Liu, et al., 2018).

### **3. Research Methods**

To assist this research, a research phase framework is needed. The stages of this research are the steps that will be tried in solving the problems discussed. There are also stages of research used are as follows:

#### **Identification of problems**

The object of this research is the office of Lau Gumba Village, Brastagi District, Karo Regency. To facilitate the performance of village officials, it is necessary to design network routing in order to speed up the existing network at the village office.

#### **Parameters Observed**

This research was conducted to find out what parameters can improve the performance of the MANET network after being hit by a Blackhole attack. The author divides several experiments, namely without attacks, exposed to blackhole attacks and improvements to the number of nodes, data rate and distance between nodes. In the first experiment, there was no attack and the parameters were left as default. Subsequent attempts, with black hole attacks and others left by default. Then for the last one, the experiment was carried out by changing several parameters such as the number of nodes (30 nodes, 35 nodes, 40 nodes), data rate (350 kbps, 400 kbps, 450 kbps, 550 kbps and 600 kbps) and the distance between nodes (30 meters). and 40 meters).

### Data analysis

After collecting data in the field, data analysis will be carried out on the data that has been obtained. To achieve the research objectives as expected, the data that has been collected will be analyzed, because it is very influential on drawing conclusions. The data analysis technique used in this research is quantitative descriptive analysis. That to find out the problems in society, the methods and processes that apply in society related to activities, views and effects of phenomena are used from a descriptive phenomenon.

### Research Procedure

This framework is the steps that will be taken in order to solve the problems that will be discussed. Figure 1 below is the framework used in this research:

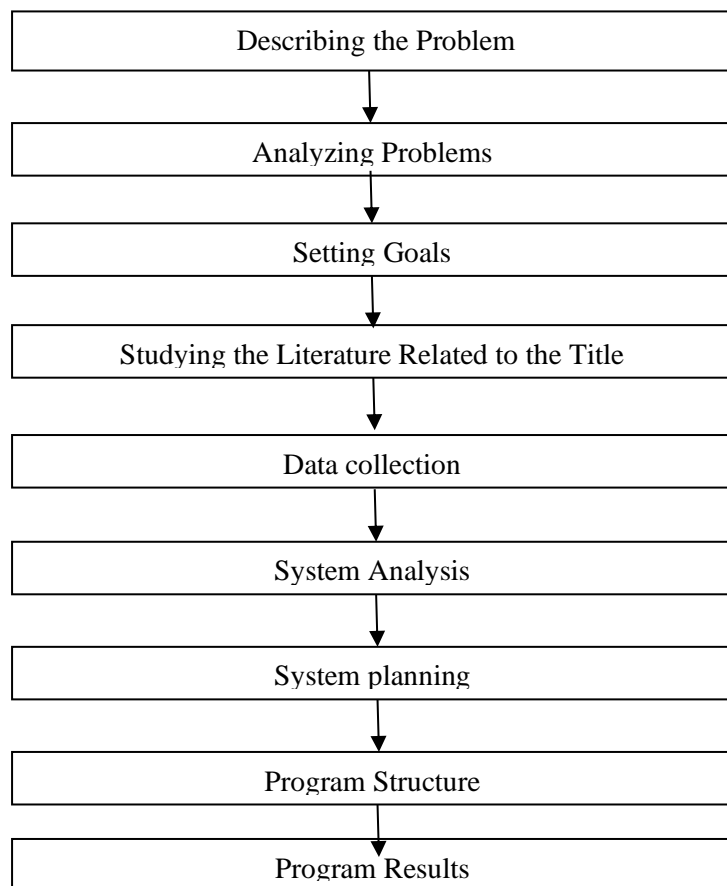


Fig. 1. Research Framework

## 4. Results and Discussions

Based on the research that has been done, the authors propose the VLAN network model as a good solution because by using the VLAN network model, network administrators can more easily group workstations in the network based on their function with Broadcast control, Security,

Performance and Management. With the development of a network that uses the principles of core, distribution, and access, it can facilitate network development where VTP technology is used which can maintain the consistency of the VLAN configuration.

**1. Device Used**

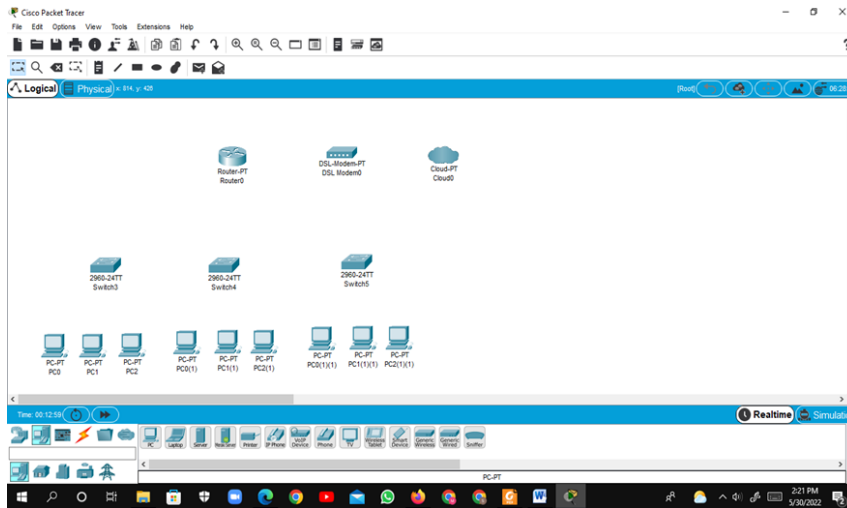


Fig. 2. Device Used

In this study, the tools used consisted of nine computers, three switches, one router and one server. In this network modeling, researchers create three classes of IP addresses that will be connected to each other so that they can be used simultaneously on the available network groups.

**2. Routing Model Test Results**

The results of testing the routing model using the command line interface in this study have succeeded in connecting three groups or groups of village computers and can be connected to each other.

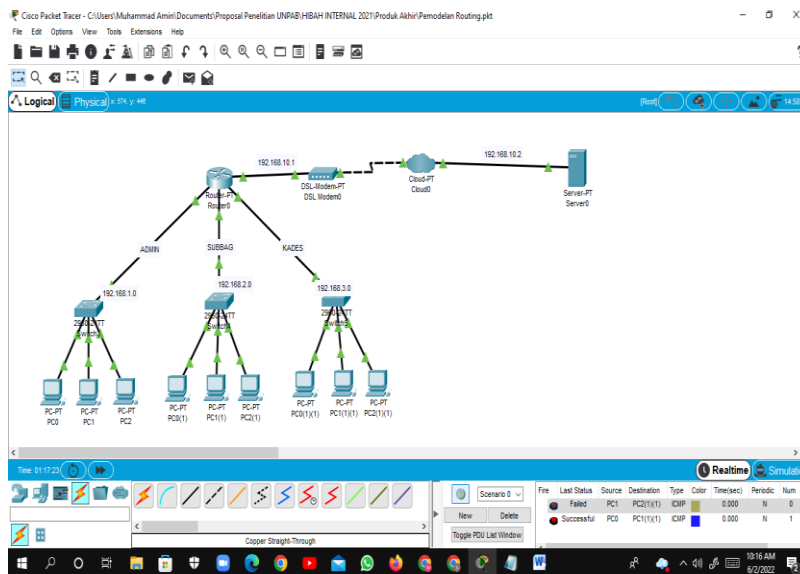


Fig 3. Routing Model Test Results

In the scheme, the network switch will be made up of 3 layers, namely Core Switch as the first layer, Distribution Switch as the second layer and Access Switch as the third layer. The function of the Core Switch is as a network switch that combines several network switch devices into a single unit (integrated network). Distribution Switch serves as a liaison between Core

Switch and Access Switch. Access Switch serves as a liaison between the network and the end user's computer. The connection results can be seen in the image below. In the scheme, the network switch will be made up of 3 layers, namely Core Switch as the first layer, Distribution Switch as the second layer and Access Switch as the third layer. The function of the Core Switch is as a network switch that combines several network switch devices into a single unit (integrated network). Distribution Switch serves as a liaison between Core Switch and Access Switch. Access Switch serves as a liaison between the network and the end user's computer. So in conclusion, by using the multi layer switch method, we can extend the number of computers connected to the network. The example of the arrangement of the 3 layer network switches above can be further developed into several layers down depending on the needs of the number of networks. Star topology is considered very suitable for use in large networks such as Lemhannas because Star topology is used in dense networks, when endpoints can be reached directly from a central location, need for network expansion, and require high reliability. This topology is an arrangement that uses more cables than buses and because all computers and devices are connected to a central point. So if there is one computer or device that is damaged, it will not affect the others. In the picture above you can see that all the devices have been connected which are marked in green on each connecting cable. The author uses ip dhcp for the connection system used on each computer and device. The simulation is divided into three rooms, namely the admin room as administration, the sub-section room as the checking controller and the village head room as the administrator and policy ratifier. Static routing is the simplest routing arrangement that can be done on a regular network. Static routing are routes to the destination host or network that are entered manually by the network administrator in the routing table of a router (Edi, 2006). Static routing will not change the information in the routing table automatically, so administrators must make changes manually if there is a change to the network topology. The use of static routing in a small network is certainly not a problem, but of course you can imagine what if you have to complete the routing table for each router, which is not small in large networks or the internet. Therefore, the use of static routing in large-scale networks tends to require extra work and time to complete the routing tables of all existing routers. The IP settings used are IP DHCP to facilitate IP settings when adding computer or laptop devices because the user or user does not need to set the IP again to be used so that IP conflicts do not occur because IP is searched automatically.

## 5. Conclusion

To obtain the desired research results, the following activities will be carried out: Create a command line interface program to make IP management so that network modeling can be done. The simulation carried out by the author can be run well without any problems. This study still uses 3 computer groups and class 3 IP classes with different classes. In this study, the expected results can be implemented on a real network. This research is still using a network simulation application, the authors hope that further research can be implemented in real terms so that they can more clearly understand network modeling with good IP computer management so that IP conflicts do not occur.

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