ARCHITECTURE OF COMPUTER NETWORKS FOR FOUR FLOOR BUILDINGS AT WIDYATAMA UNIVERSITY USING DHCP CONFIGURATION ON CISCO PACKET TRACER

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Abstract---This paper discusses the architecture of computer networks in a four-floor building at Widyatama University. Switches are used to connect devices such as computers, printers and laptops so that all networks are connected. Dynamic Host Configuration Protocol (DHCP) configuration is used in assigning IP addresses to devices. There is also a simulation using packet tracer, a simulation for computer networks for students in version 6.2.

Keywords---vnetwork, DHCP, simulation, packet tracer

I. Introduction

In the world of education, the use of the internet has become an inseparable need. Besides being used in the teaching and learning process, the internet is also used to manage administration on campus and to find information both that is related to internal campus and external campus. The use of the internet is inseparable from the existence of a computer network on the campus. Widyatama Foundation is a private university located in Bandung which was originally named the Bandung Education and Teaching Foundation. Founded on January 3, 1973 initiated by Dra. Koesbandijah Abdoel Kadir, MS, Ak., (Now Prof. Dr. Hj. Koesbandijah Abdoel Kadir, MS, Ak.,). Over time in 1993, the foundation was renamed the Widyatama Foundation or the proposal of Lien Tanudirja, SH [1]. With the development of development at Widyatama University, the writer chose one of the buildings at Widyatama University to design his computer network architecture as one of the requirements of the Kompter network course at Widayatama University.

The development of computer networks today is so rapid. Along with these developments, the user's need for network quality is increasing. The quality in question is a computer network that is free from problems such as slow data

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transmission, unstable connections and so on so that it can indirectly reduce work productivity. Computer network connection is a fundamental thing in a network, because if the connection is problematic then all computer networks cannot be used.

Considering the need for computer network information is so important especially to look for network damage quickly, easily, and cheaply, then to overcome the above problems a network administrator requires an application to simulate the architecture of the computer network used. By using the Cisco packet tracer application, data simulations about the network can be utilized to be information about the state of connection of a computer in a network, if there is a problem in network interconnection.

II.   Literature Review

A computer network is a collection of computers, printers and other equipment that are connected and interconnected with one another to perform its tasks [2]. Two or more computers can be said to be connected to each other if these computers can exchange information through various transmission media. A computer network is basically a merger between two technologies namely computer technology and communication technology, where the merger produces a data communication technology that can be applied in a computer.

The network model represents a common structure or protocol for resolving communication between systems. TCP / IP is a collection of protocols that are built so that each type of computer of various sizes, from a variety of different computer vendors, and runs with different operating systems to be able to communicate with each other [3].

Local Area Network

Local Area Nerwork (LAN) consists of a transmission medium that is used together in which there is hardware and software that is used as an interface between devices in the transmission media and also to regulate access to media. LANs are usually owned by an organization to communicate with each other between local networks in a closed area [4].

Concentrator

Hub or concentrator is a hardware device that has many ports that will connect several points in a computer network [3], a hub that functions to combine several computers into one network group. From the transmission technology side, it turns out that the hub has a few deficiencies, the hub will broadcast all packets will be sent to one destination IP. On computer networks we often hear the word hub and switch, the shape of these two tools are similar and the basic function is also the same, namely to transfer data in the network [5].

Subneting

Subnet is a term of information technology that refers to a 32-bit binary number that is used to distinguish the network ID from the host ID and indicate the location of a host, whether it is on a local network or outside network [2]. The use of a subnet mask called an address mask as a 32-bit value is used to distinguish the network identifier from the host identifer in an IP address

Cisco Packet Tracer

Cisco Packet Tracer is one of the applications made by the Cisco company located in San Francisco, California, which was founded in 1984. Cisco Packet Tracer is used as a simulation tool in learning computer networks and IoT. In this software, there are several tools that are often used in designing a network system.
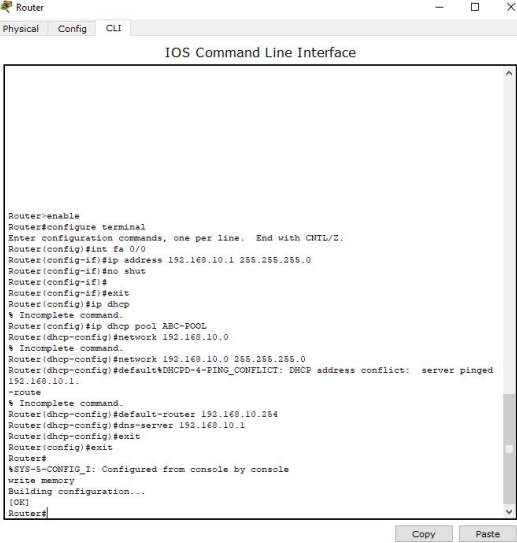
Server

The server is a central computer that is used to serve hardware that is connected to the network. On the server the DHCP Server is configured so that devices connected to the server will get an IP Address automatically.

III. Research Methodology

In this study simulated LAN and wireless networks [6]. This network is designed for 4 (four) storey buildings. The criteria for the network created are server computers on the 4th (fourth) floor, on the 1st (one) and 4th (fourth) floors there are wireless routers for laptop communication, while the other floors use switches.

Before the simulation is performed it is necessary to configure the existing router connection. Figure 1 is a process of router configuration on the simmulation that will be made.

Figure 1: Router Configuration

Router configuration is made with DHCP type so that the computers, printers, and laptops do not have to enter their respective IP addresses. After configuring the router, configure the other device to DHCP. This process is shown in Figure 2
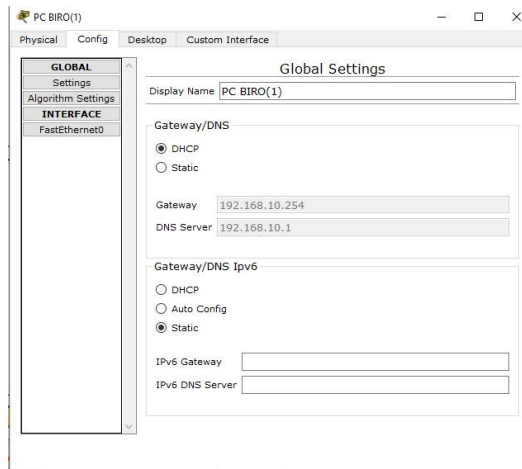
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Figure 2: Configuration on computer devices, laptops, and printers

In the config menu select DHCP for the gateway settings. Automatically all settings (IP Address, DNS server, and default gateway) will be filled by the program. Then configure the wireless router because floor 2 (two) and floor 4 (four) use the wireless router shown in Figure 3
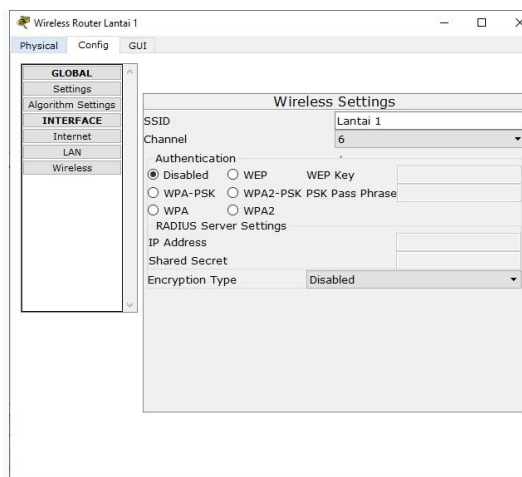

Figure 3: Configuring the router name

Give the name of the router to be recognized by the device that will be connected to the router. Then from the hardware hardware configuration. This is done because the default device will use a LAN adapter. Make sure when changing the device to turn off. The configuration for changing a LAN adapter to a wireless adapter is shown in Figure 4 and Figure 5.
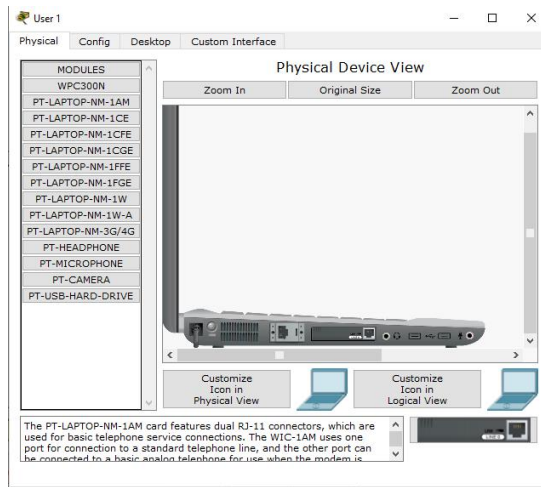
Figure 4: Hardware configuration on a laptop (LAN adapter)

After the configuration is done, enter the Desktop menu and select Wireless PC. In the show Wireless PC select the Connect submenu then refresh and choose the name of the router that will be connected to the device. This configuration is shown in Figure 6, Figure 7,
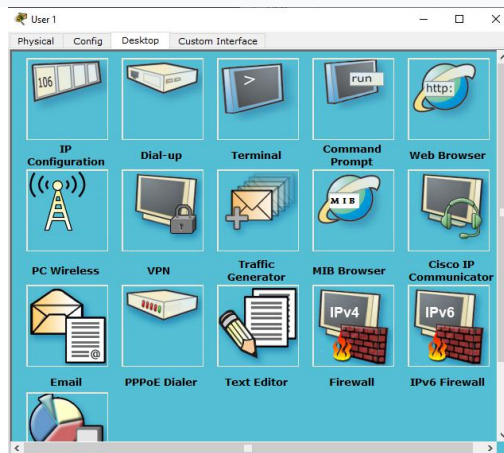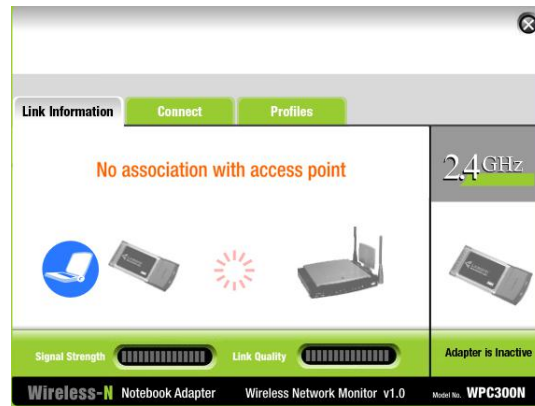

Figure 6: Desktop Menu on a Laptop device

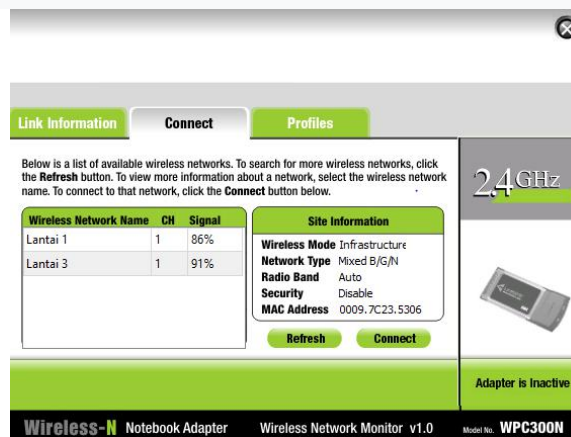Figure 7: The main menu on the Wireless PC display

Figure 8: The Connect submenu on a Wireless PC 1.

Simulation and Testing Cisco This process is carried out with reference to the condition of the building. Simulations carried out for LAN networks and wireless networks. Every computer, printer, and laptop sends messages both on one floor and between floors. Figure 9 is the layout of the simulation performed.
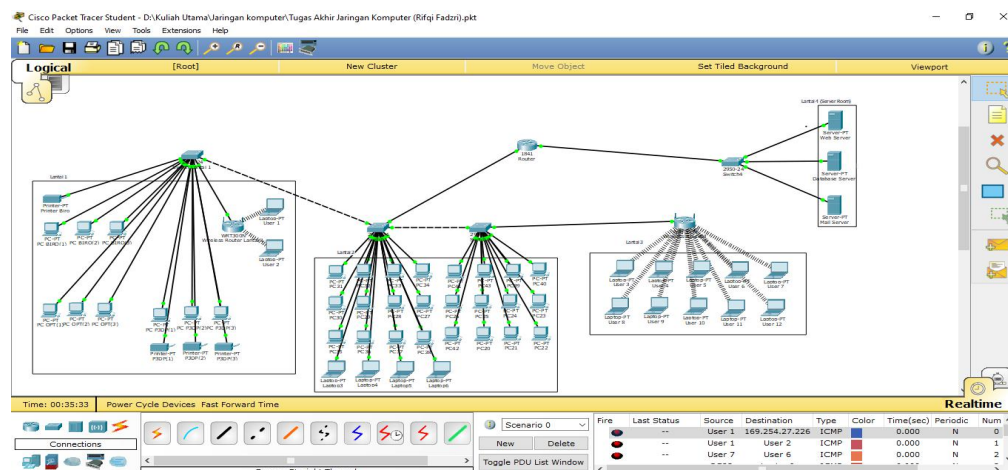

Figure 9: Layout as a whole

sending messages using existing tools on the Cisco packet tracer. Figure 10 shows the results of a trial of sending messages conducted on several devices between floors.

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num
●	Successful	User 7	User 6	ICMP	🟥	0.000	N	25
●	Successful	PC40	Laptop3	ICMP	🟨	0.000	N	26
●	Successful	PC P3...	Printer Biro	ICMP	🟪	0.000	N	27

Figure 10: Testing delivery of messages

IV. Conclusions

This research uses sisco packet tracer for student 6.2. The simulation was carried out on a multi-storey building, at Widyatama University. In the Test used Dynamic Host Configuration Protocol (DHCP). By using this configuration, the IP address on each device does not need to be set so that when the device is connected it will immediately get an IP Address by itself. For routers, the DNS server, network, and gateway are still being configured, this is done because the DHCP settings on the device will refer to the router's configuration. From the simulations that have been made, all devices can be connected either with their own floors or between floors.

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