COMPUTER NETWORK

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MUP

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FOREWORD

Alhamdulillah, praise and gratitude are conveyed to the presence of Allah SWT who has given the author the leeway and opportunity to compose the book " Network This computer . The guidebook is prepared based on the 2015 curriculum which was implemented from the odd semester 20 22 /20 23 .

This practical manual has undergone several developments since the first version used in the " Networks" course Computer ". This practical guide has been corrected here and there regarding typos and updated knowledge. In 2016, two new chapters were added that were optional for the final practicum. In 2022 an addition will be made material about network computer .

The chapters in this book are divided into two large parts. first part about introduction network computer about switches and parts second about routing.

The author hopes that this book is useful and can be used optimally in understanding students about processes planning network computer . The author also does not forget to thank the various parties who helped in completing this book, starting from the leadership of the Informatics Study Program, fellow lecturers, especially those who teach the parallel course " Networks Computer ", assistants and staff. Criticism and suggestions are highly welcomed to improve the content and layout of this practical manual.

May Allah swt bless us all.

Surakarta, January 2024

Writer

LIST OF CONTENT

MODULE 1

INTRODUCTION TO STRAIGHT CABLES AND CROSSOVER

A. Goals

- Understand UTP cables and Connectors
- Understand how to install connectors on UTP cables
- Understand how cables are made and used Shatrigt
- Understand how to make and use cross cables

B. Introduction

UTP cable stands for "Unshielded Twisted Pair", namely this type of cable is made from copper conducting material, has plastic insulation & is wrapped in insulating material which can protect it from fire and physical damage, UTP cable itself consists of 4 pairs of cable cores that are twisted together. where each pair has a different color code.

The function of UTP cables is that they can be used as cables for Local Area Network (LAN) networks in network systems or computer networks, and generally UTP cables have an impedance of approximately 100 ohms, and are also divided into several categories based on their ability to conduct data.

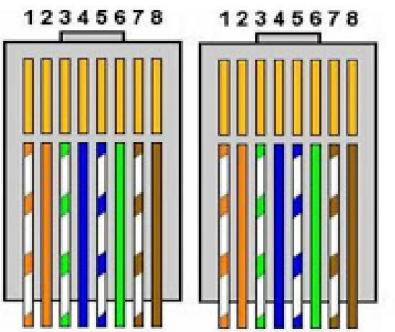
To connect a computer network using cables, there are two types of cables that can be used, namely straight and cross cables. The difference between the two cables is in the arrangement of the cables. If cross cable is used for connecting the same device, for example HUB with HUB, PC with PC. Meanwhile, straight cables are used to connect different devices, for example a HUB with a PC and vice versa.

Difference between Straight and Cross Cables

Before we start making cables, it's a good idea to know the function of each cable.

1. Straight Cable

   Straight cables are cables that have the same installation method from one end to the other. Which is used to connect network devices of different types. The order of straight cable standards is as below, namely in accordance with the TIA/EIA 368B standard (the most widely used) or sometimes also used according to the TIA/EIA 368A standard as follows:



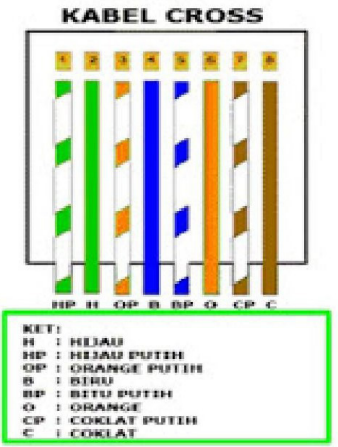
Straight-Through

   Examples of using straight cables are as follows:

   - Connects the computer with the switch
   - Connect the computer to a LAN using a cable/DSL modem
   - Connect the router to the LAN on the cable/DSL modem
   - Connect the switch to the router
   - Connect the hub to the router

2. Cross Cable

   Cross cables are cables that have a different arrangement between one end and the other. Cross cables are used to connect 2 of the same device. The image below is the standard arrangement of cross cables.



Examples of using cross cables are as follows:

- Connect 2 computers directly
- Connect 2 switches
- Connect 2 hubs
- Connect the switch with the hub
- Connect the computer to the router

Of the 8 cables in this UTP cable (both straight and cross over cables) only 4 are used to send and receive data, namely the cables on pins No. 1, 2, 3 and 6.

C. Tools and Materials

1. Crimping Tanks

   Tank Crimping is a tool for cutting UTP cables and for clamping the end of the Rj-45 connector, and usually for stripping the outer UTP cable, and this tool is very important for those of us who want to learn how to crimping cables.

   This tool looks almost the same as the ordinary tank that we often see or encounter, as in the picture above

2. UTP cable

   UTP cable is used as a network connection medium and also a data transmission medium and in this UTP cable there are 8 strands of small, colorful cables according to predetermined standards.

3. Rj-45 connector

   The Rj-45 connector is a tool that we attach to the end of the UTP cable, so that we can plug the cable into the LAN port on the PC. The RJ-45 connector must be attached to the end of the UTP cable, both straight and cross

4. LAN Taster

   LanTester is a tool for testing cable crimping results, if our crimping is wrong then the light on the Lan Tester will not turn on and if our crimping results are correct then the light on the Lan Tester will turn on automatically according to the order of the Cross or Straight cables, so this tool is very useful. It is useful for us to know the results of the crimping or cables made.

D. How to Make Straight and Cross UTP Cables

After we know the function of each cable, students will then carry out practical work on making straight and cross cables.

1. How to Make Straight Cables

The steps for making straight cables are as follows:

a. Peel the end of the UTP cable, approximately 3 cm using Tank Crimping.

b. Open the 4 cable twists into 8 sections, then straighten and sequence the cables according to straight cable standards.

Fig. 4 twist UTP cable

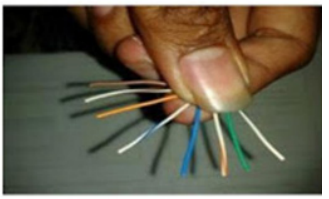
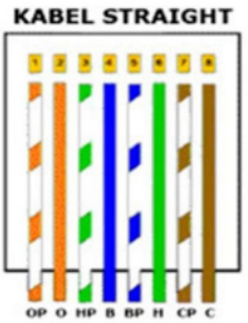
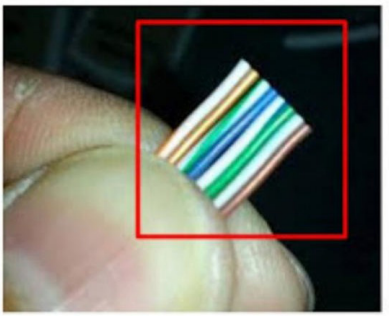


Fig. 8 section UTP cable



c. After the sequence is according to the standard, cut and flatten the ends of the cable using a crimping tank or other tool.



d. Insert the straight and parallel cable into the RJ-45 connector, with the locking position of the Rj-45 connector at the

bottom and make sure all cables are positioned correctly in the following positions:

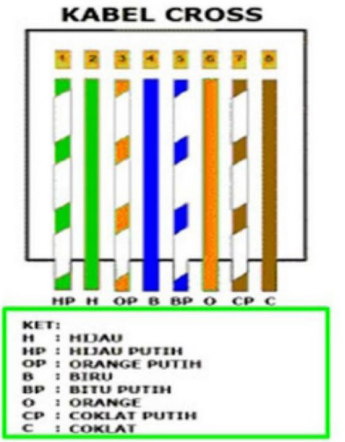
e. Next, do the crimping using a tank crimping tool, press the crimping tool and make sure all the pins (brass) on the RJ-45 connector have bitten into each cable. Usually you will hear a "click" sound.

2. How to Make Cross Cables

Making a cross cable has almost the same steps as a straight cable, the only difference lies in the color sequence of one end of the cable. This is different from straight cables which have the same color sequence at both ends of the cable.

The final step is to check the cable that was made earlier using a Lan Tester, by inserting each end of the cable (RJ-45 connector) into each port available on the Lan Tester, turn it on and make sure all the LED lights are on according to the cable sequence. made.

If it is correct, it means the cable is ready to be installed on the network, however, if an error occurs in installing the cable in the connector, then to recreate it you have to cut and repeat the method as explained in the first point.

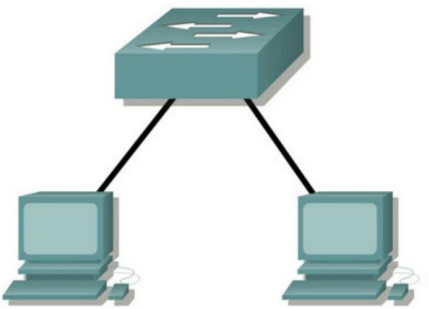


Task 1

1. Create a peer to peer network
    a. Step 1: choose a partner
    b. Step 2: Prepare equipment including: 2 PCs/Workstations 1 crossover cable
    c. Use a crossover cable to connect directly between PCs/ workstations via the respective Network Interface Card (NIC)/ network card. If you look at each end of the cable on the RJ45, the orange and green cables are in different positions at each end.
    d. Step 2: Provide the IP address of each PC PC IP 1: 192.168.1.100 IP PC 2: 192.168.1.200
    e. Check connectivity
2. Type the ping command to check whether PC 1 is connected can reach PC 2 and vice versa. From PC 1 type ping 192.168.1.200. From PC2 type: ping 192.168.1.100 3. What is the output of the ping command? Write it down!
3. If one of the cables is unplugged, what is the output of the ping command? Write it down!

TASK 2

1. Make a circuit like below.



    a. Step 1: Connect both PCs/workstations to the switch What cable do you use?

    _____

b. Step 2: Check connectivity
PC IP 1: 192.168.1.10
IP PC 2: 192.168.1.20

2. Use ping, what is the output of the ping command if they are connected to each other? Write it down!

_____
_____
_____
_____

3. What is the result of the ping command if you ping an address which is not connected? Write it down!

_____
_____
_____
_____

MODULE 2

INTRODUCTION TO CISCO PACKET TRACER

A. Goals

- Understand the symbols contained in Cisco Packet Tracer, as well as capable
- configure network technology through the Cisco Packet Tracer simulator.

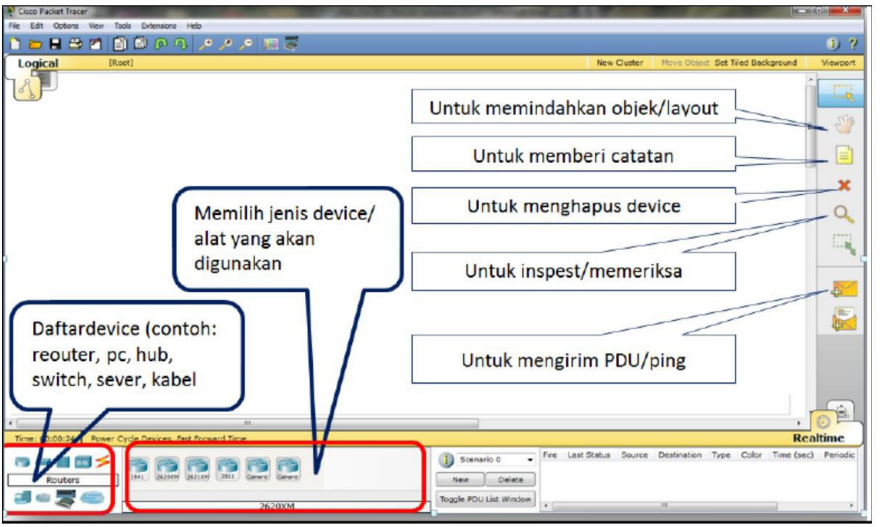
B. Introduction

Cisco Packet Tracer is a auxiliary tool or can be called a simulator for Cisco network tools. **Cisco Packet Tracer** is usually often used as a learning and research medium, including in the field of computer network simulation research. This program was created by Cisco Systems and this program is free for faculty,

students, and alumni who have participated in the Cisco Networking Academy. Basically, Cisco Packet Tracer is used as a learning medium for beginners to design, configure and solve problems regarding computer networks. In short, **Cisco Packet Tracer** makes it easy for us to learn how to design, build and configure a network. starting from simple networks to complex ones. In fact, we can also find out what things often happen in a network so that we can analyze and fix them without having to buy super expensive equipment for students who are still in the learning stage.

Cisco Packet Tracer Window Introduction

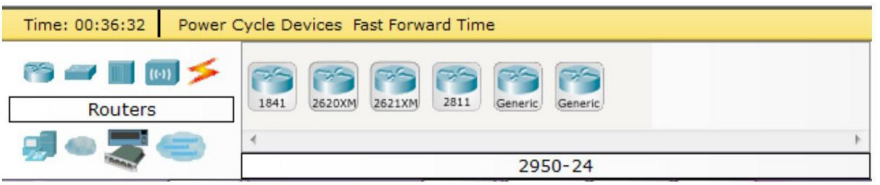
The Cisco Packet Tracer window display is As in Picture below:



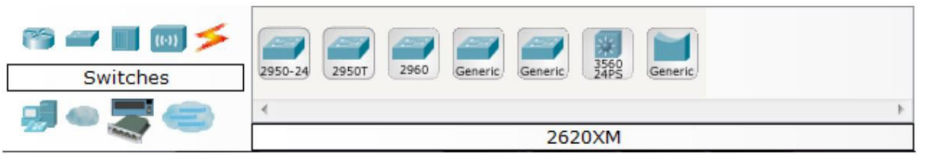
In the Device icons section, there are several types of network devices, and in the box to the right there is a Sub Device which is the type of device selected.

The following is an explanation:

1. Various devices in Cisco Packet Tracer
   a. Routers
      Functions to connect network devices on different networks. For example, to connect between LANs and between routers themselves



   b. Switches
      The switch functions to connect devices in one LAN network.



c. End devices

These are devices that will be the source and destination of data packets. Devices available on end devices include PC-PT, Laptop-PT, Server-PT, Printer-PT)

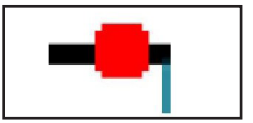
d. Connectors

The connector functions to connect network devices so they can communicate

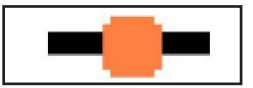
In the picture above there are types of connectors on the Cisco Packet Tracer, but in this practicum we only use a few connectors, for example straight cables and cross cables.

2. Cable Indicator Color

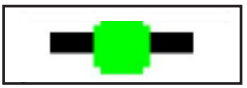
a. red indicates that the cable is not connected or a wiring error has occurred.



b. The orange color shows that the device installation/ introduction process is underway to be able to connect to each other.



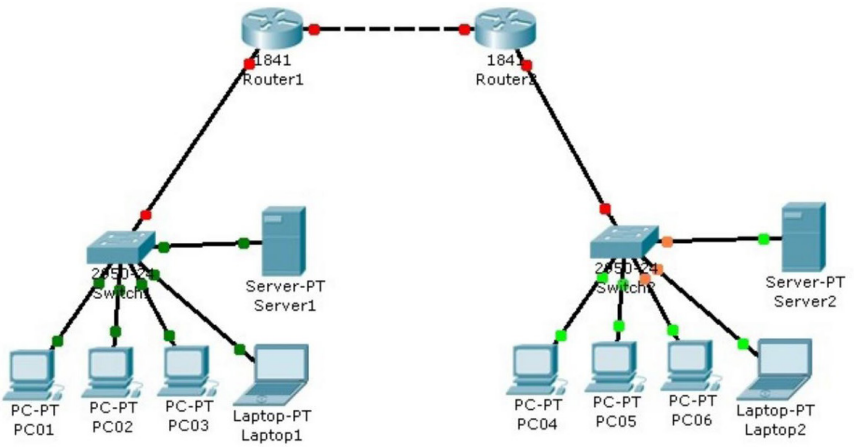
c. The green color indicates the cable has been successfully connected each other's devices



C. Practical Activities

1. Activity 1

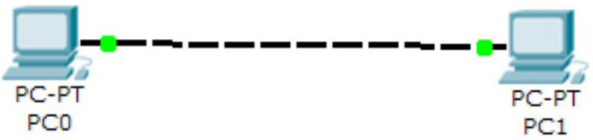
Make a computer network plan like the picture below this.



Observe the indicator lights at each point. Then explain in the column below

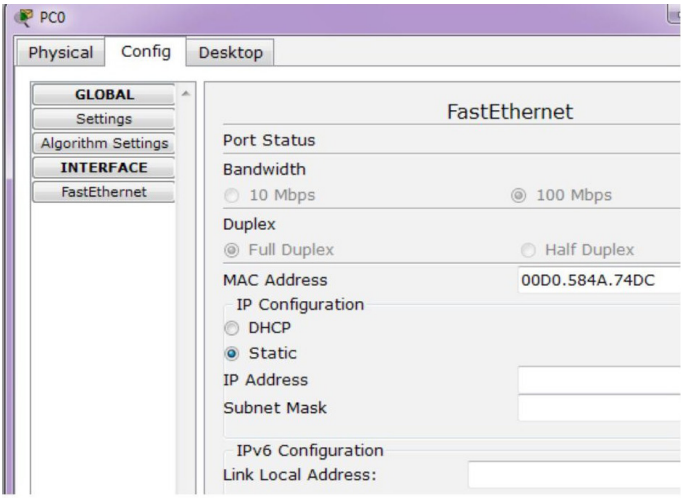
2. Activity 2. Create a Peer to Peer Network.

- Using a packet tracer, create a design like the image below

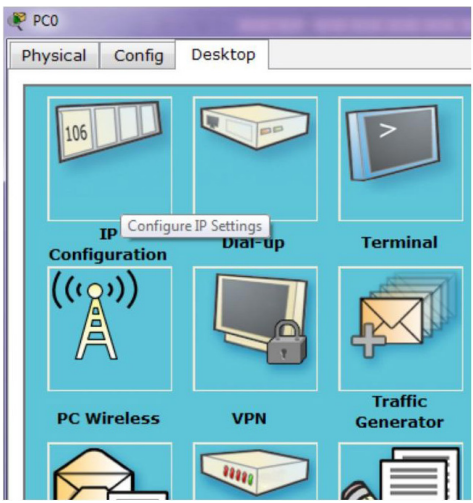


With PC0 ip address= 192.168.1.1/24 and PC1=192.168.1.2/24

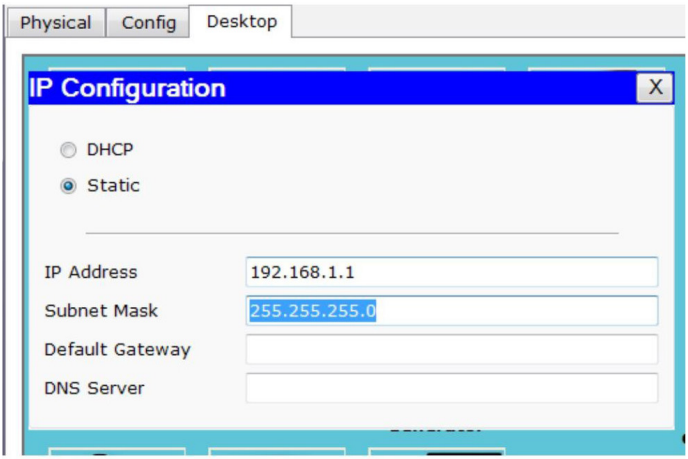
- To give an IP address, double click on the PC and the following display will appear



- In this display we can give a name to our PC, then select the desktop to give the IP address. Then select IP configuration

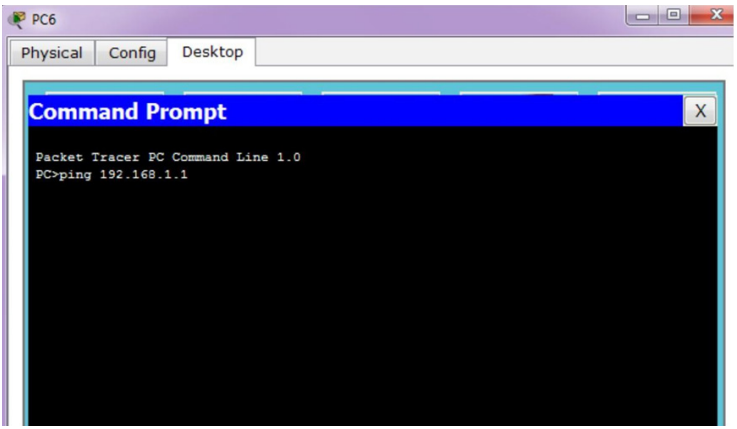


- On IP configuration, click 1x, then a display will appear for providing the IP address.

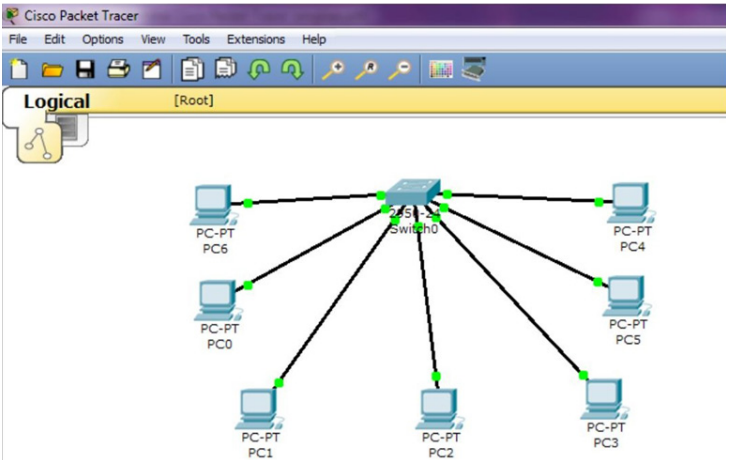


After PC 0 is given an IP address, do the same steps on PC1.

- After all the PCs have received IP addresses, ping the two PCs by selecting the command prompt on the desktop tab. Then type the command ping 192.168.1.1, then show the results to the assistant for assessment.



3. Activity 3. create a network with switches



Create a computer network design like the image above, with IP addresses

PC1=192.168.1.1	PC4=192.168.1.4
PC2=192.168.1.2	PC5=192.168.2.5
PC3=192.168.1.3	PC6=192.268.2.6
PC7=192.168.2.7	

After the circuit is complete, do a ping between

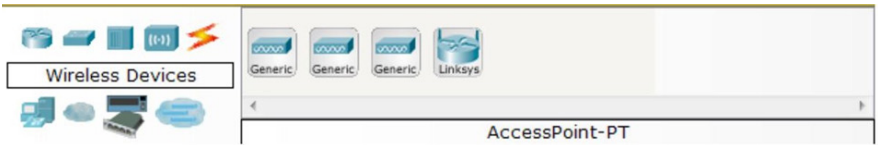
a. PC1 to PC 2

b. PC3 to PC 5

Explain the results in the column below.

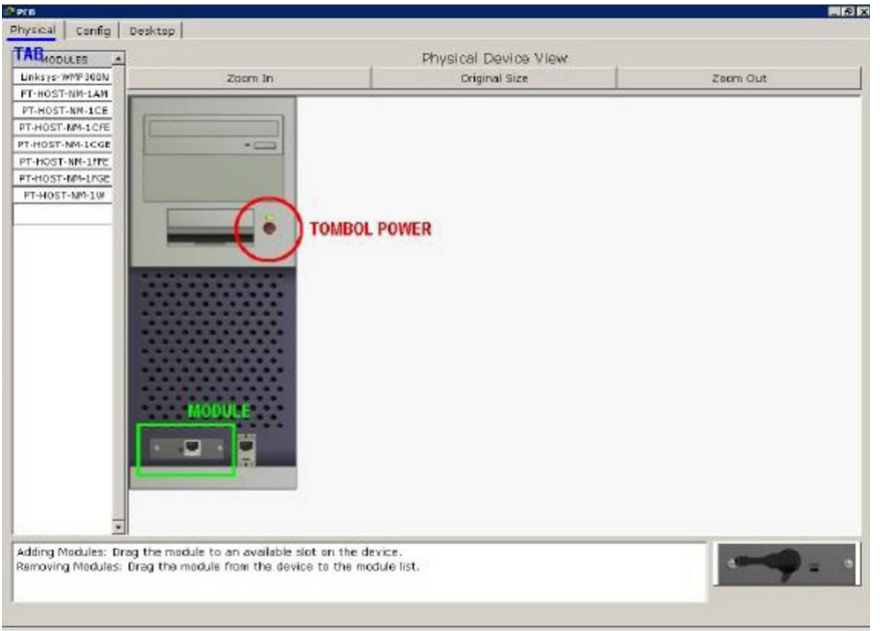
4. Activity 4. Wireless Networks

- The devices we use for practical activity 4 are wireless devices



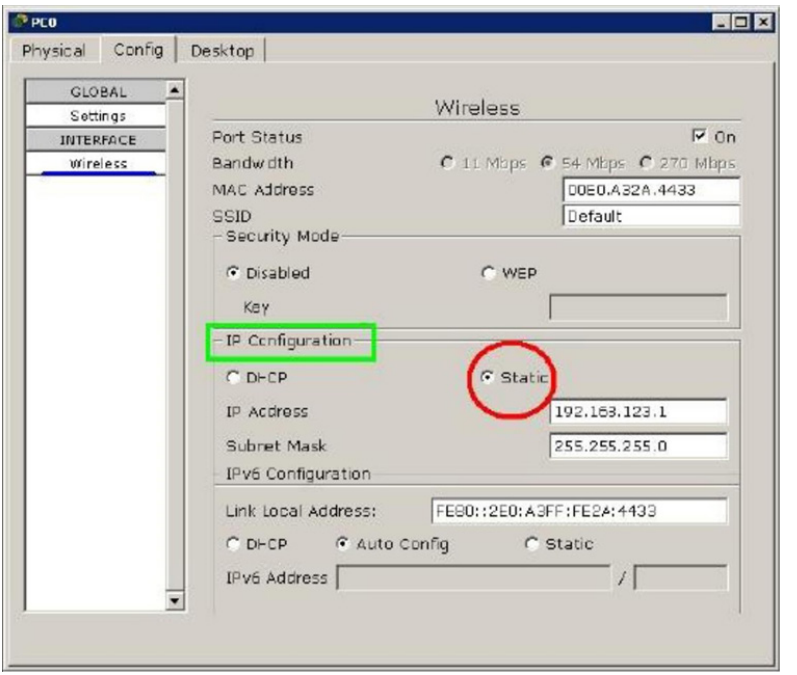
- Preparation for a simple wireless network installation in this example is to use 2 workstations and 1 access point so that it looks like the image below.

- To connect a PC device with a wireless device, we need to add a wireless module to our PC device. By. Double click on the PC, then press the power button first to turn off our PC



- After turning it off, replace the LAN card module on our PC device, by moving it to an empty place, then replacing it with

the Linksys WMP 300N device. After that, give the IP address in the following way



- If the workstation is connected between the two PCs successfully it will look like the image below.

- Perform pink between the two PCs, then view the results to the assistant for assessment.

Task

Create a network design consisting of 5 switches connected to each other, and each switch consists of 10 PCs. With an IP address between 192.168.10.10 to 192.168.10.60. assignments are included in the practicum report.