Computer Networks Laboratory
IT 3095

Lab instructions
On

DESIGN, CONFIGURATION AND SIMULATION OF A SIMPLE WIRED NETWORK USING CISCO
PACKET TRACER

Aim: T o design, configuration and simulation of a simple wired network using cisco packet tracer.

Software Required: CISCO Packet Tracer

Network Specifications: Two Virtual Local Area Networks (VLANs), one VLAN for Web server.

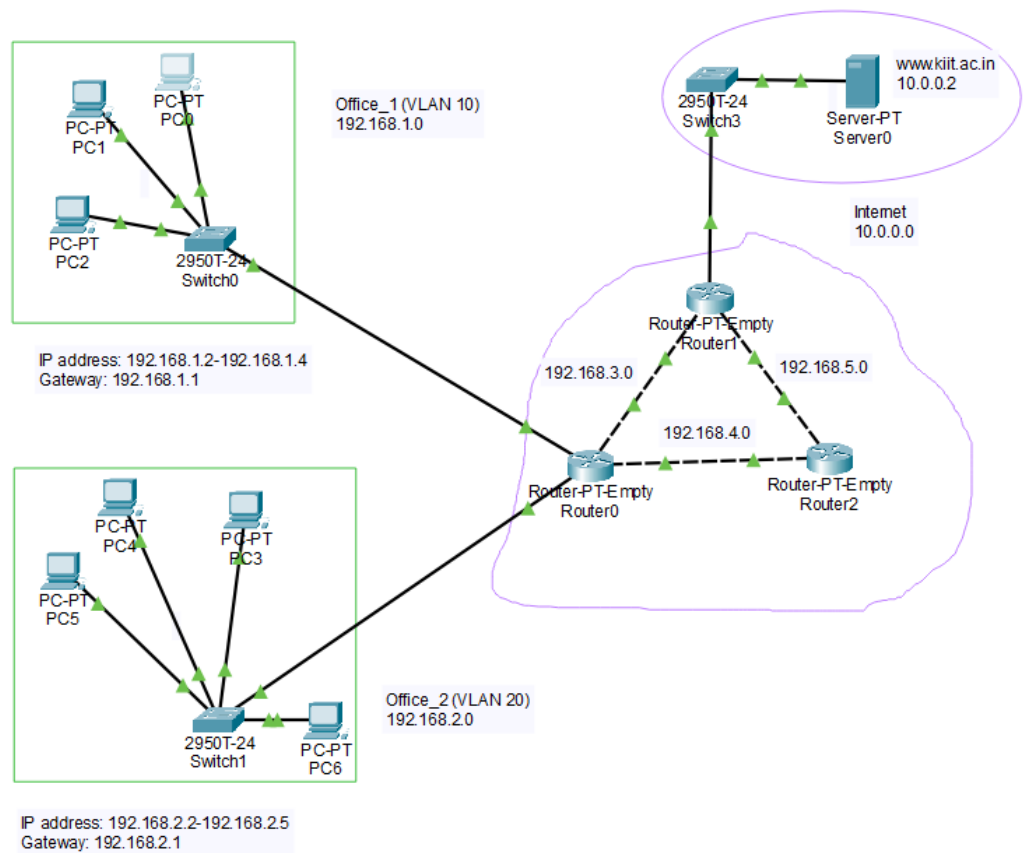**Network Design:** The network scenario is as shown below:

Figure: Network scenario.

Network configuration: The table below can be referred for the network configuration.

VLAN No.	Name	Network Address	IP Configurations (Range of IP Addressgiven to Laptop/PC)	Gateway
VLAN 10	Office_1	192.168.1.0/24	192.168.1.2-192.168.1.4	192.168.1.1 → Router IP address
VLAN 20	Office_2	192.168.2.0/24	192.168.2.2-192.168.2.5	192.168.2.1 → Router IP address

The network configuration in terms of IP address is shown below:

Network	Network address	IP address to end devices	Default gateway	Interface
Office_1	192.168.1.0	192.168.1.2-192.168.1.4	192.168.1.1 (for all end devices)	One interface of router to this network will have IP 192.168.1.1
Office_2	192.168.2.0	192.168.2.2-192.168.2.5	192.168.2.1 (for all end devices)	One interface of router to this network will have IP 192.168.2.1
Internet	10.0.0.0	10.0.0.2	10.0.0.1 (for all end devices)	One interface of router to this network will have IP 10.0.0.1

Between Ro and R1	192.168.3.0	192.168.3.1-192.168.3.2	NA (as it's not an end device)	An interface of router Ro to this network will have IP 192.168.3.1. and an interface of router R1 to this network will have IP 192.168.3.2
Between R0 and R2	192.168.4.0	192.168.4.1-192.168.4.2	NA (as it's not an end device)	An interface of router Ro to this network will have IP 192.168.4.1. and an interface of router R2 to this network will have IP 192.168.4.2
Between R1 and R2	192.168.5.0	192.168.5.1-192.168.5.2	NA (as it's not an end device)	An interface of router R1 to this network will have IP 192.168.5.1. and an interface of router R2 to this network will have IP 192.168.5.2

Default subnet mask for all networks are: 255.255.255.0

Server Configuration

- The server is located on Internet with Network Address: 10.0.0.0/8
- Server network is Class-A Networks default with subnet mask: 255.0.0.0

Type of server: HTTP(s) Server hosted on a Server.
IP Address of Server machine 10.0.0.2 (e.g., www.kiit.ac.in)
Default Gateway: 10.0.0.1

Cable Specifications:

- **(Between PC/Laptop/Server to Switch and Switch to Routers)**
  - Connections → Copper Straight-Through

- **(Between Routers to Routers)**
  - Connections → Copper Cross –Over

Switch Specifications:

- Type: CISCO 2950T-24 (Switch with VLAN support)
- IEEE 802.3 Fast Ethernet (FE-Copper)
- Standard: 100-Base_TX
- Configure VLANs

Router Specifications

- **Type:** Generic (Router-PT-Empty)
- **Add Hardware interfaces:** Fast Ethernet 100 M
- **Network Interface Card (NIC):** Network Adaptor : IEEE 802.3 Fast Ethernet(FE-Copper)
- **Standard:** 100-Base_TX
- 4 NICs for Router 0 (R0)
- 2 NICs for Router 1 (R1)
- 3 NICs for Router 2 (R2)
- **Routing Protocol:** Routing Information Protocol v.1 (RIP v1)→ to be configured later

- In between R0 – R1 (Network: 192.168.3.0/24)
- In between R0 – R2 (Network: 192.168.4.0/24)
- In between R1 – R2 (Network: 192.168.5.0/24)

PC/laptop/ Server Specifications:

- End Devices → Generic PC/laptop/Server

Procedure:

A. Basic Configuration:
1. Start the Cisco Packet Tracer Software and OPEN it GUI using the icon.
2. Place all the components as shown in the network scenario.
3. Group the networks, Internet, etc. using rectangle, ellipse, etc. shapes for proper visualization.
4. **Switch configuration:**
   VLAN Configuration: **(CLI Mode)**
   - Click on the switch which you want to configure. For e.g., **Switch 0**.
   - Click on **CLI**.

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RETURN to get started. → Press Enter

Switch>en
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#vlan 10                          → as per the requirement
Switch(config-vlan)#name Office_1               → as per the requirement
Switch(config-vlan)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console
                Press Enter
Switch#config t
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#interface range fa0/1-4          → as per the requirement
Switch(config-if-range)#switchport access vlan 10   → as per the requirement
Switch(config-if-range)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console
                Press Enter
Switch#
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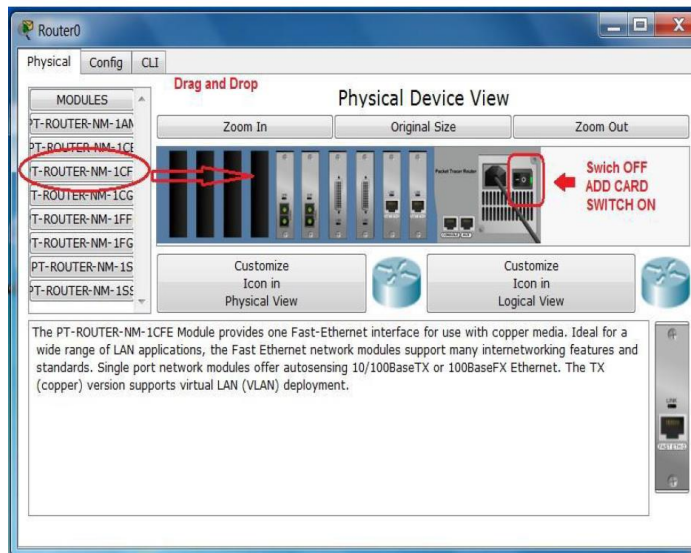
Note: As per above command do configuration for all switches. For server switch, it is not required.

5. **Router configuration:**
   - Double-Click on Router to open menu. Switch off router first. Then add **PT-ROUTER-NM-1CFE** NIC card to it by dragging.
   - Add such NIC card as per the network scenario. For e.g., for Router_0, we need 4 such NIC card.
   - Refer the diagram shown below.

6. **Connect the all end devices and networking components using appropriate cables**.
   a. **(Between PC/Laptop/Server to Switch and Switch to Routers)**
      i. Connections → Copper Straight-Through

   b. **(Between Routers to Routers)**
      i. Connections → Copper Cross –Over

7. **IP configuration of routers:**

➢ Give the suitable IP address to all routers interfaces. Double click on router→ **config→ select the suitable interface → Give the IP address**.

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- Click on **config**, and
- Select corresponding NIC
- Give IP address (the second IP address)
- This IP will be used as default gateway for all devices on this network.
- 1st IP is not given to any device. It is used to just recognized the network. It used in Routing configuration.
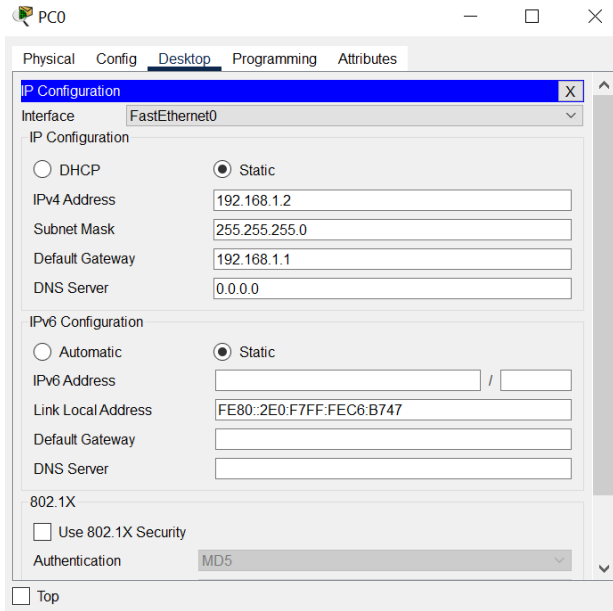- Ensure port status is **on**
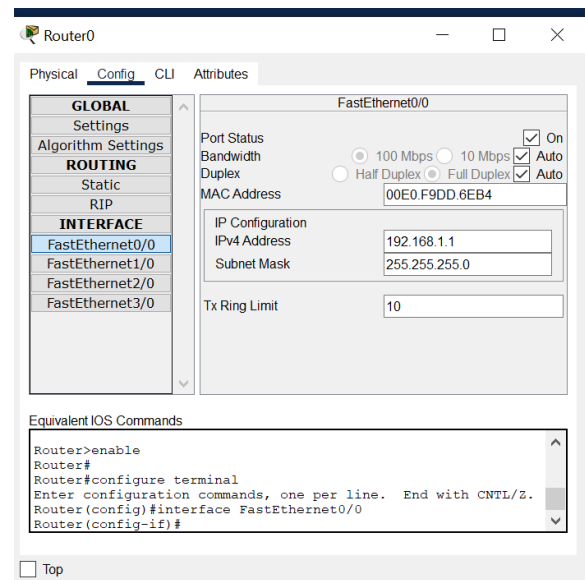
➤ Repeat above steps (i.e., IP configuration for all routers)

8. Now configure each end devices (PC/Laptop, etc)
➤ To provide IP address to end device
o Select the end device
o Select desktop➔ IP configuration
o And give the IP address very carefully. Default gateway will be the IP address given to the router interface connected to this VLAN network.

9. Configure routing protocols in all routers
➤ Click on router which you want to configure.
➤ Select **RIP** as routing protocols.
➤ Add all network manually one by one.
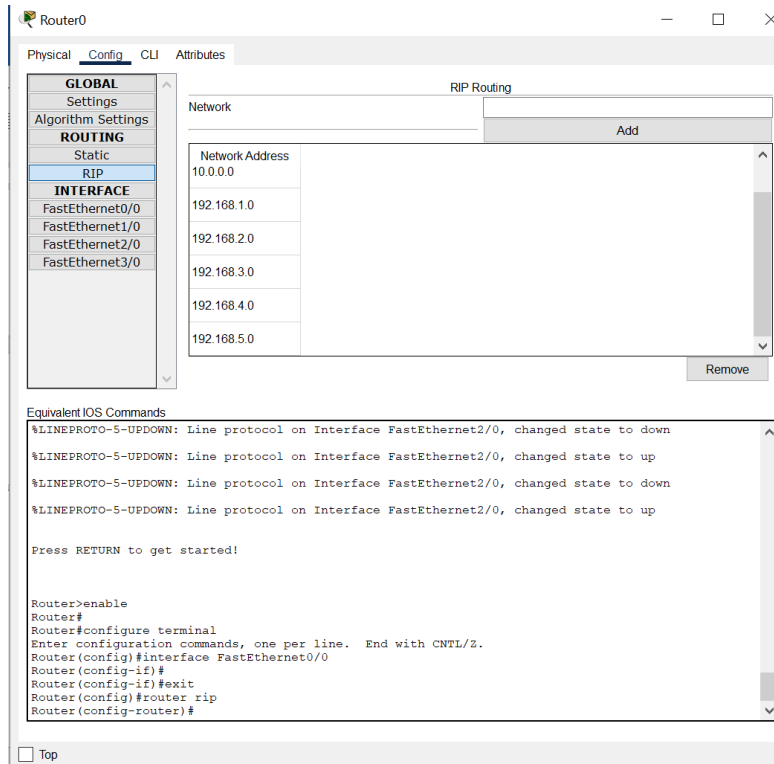
Observation:

- Observe the connectivity among different end devices using PING command (such as Office_1 to server, Office_1 to Office_2, and Office_2 to server).
- Observe the HTTP file hosted at the web server using web browser. Add your name and roll no in HTTP file and then take the screen shot.
- Add simple PDU and observe the packets flow in simulation mode.
- Add complex PDU and observe the packets flow in simulation mode.

Conclusion: Write the conclusion in your own words.

Note: The following screen shorts you need to include in the lab record.
- The screen shots in support of your observations in addition to the network design must be included in the lab record.