Computer Networks (VIRTUAL LAB)

MCA - Sem 2

Exercise 1: Cabling the Devices

1.a - Demonstration of Cross Over Cable with P-P Network

Objective: To demonstrate the use of a crossover cable to connect two PCs directly in a peer-to-peer (P-P) network.

Components Required:

- 2 PCs
- Copper Cross-Over Cable

Addressing Table:

- PC0: IP Address - 192.168.10.1, Subnet Mask - 255.255.255.0
- PC1: IP Address - 192.168.10.2, Subnet Mask - 255.255.255.0

Procedure:

1. **Drag 2 PCs into the Console Area:**
   - Open the network simulation tool.
   - Drag and drop two PCs into the workspace.
2. **Select Connectivity & Copper Cross-Over Cable:**
   - Click on the connectivity options.
   - Select the copper cross-over cable.
3. **Connect PC0:**
   - Click on PC0 to get the interface options.
   - Select the Fast Ethernet (Fa0/0) interface.
4. **Connect PC1:**
   - Click on PC1 to get the interface options.
   - Select the Fast Ethernet (Fa0/0) interface.
5. **Configure IP Addresses:**
   - Click on PC0.
   - Go to the Desktop tab.
   - Click on the IP Configuration icon.
   - Configure the IP address 192.168.10.1 and subnet mask 255.255.255.0.
   - Repeat the same procedure for PC1, configuring it with the IP address 192.168.10.2 and subnet mask 255.255.255.0.
6. **Check Logical Connectivity:**
   - Click on PC0.
   - Go to the Desktop tab.

- ○ Click on the Command Prompt icon.
- ○ Type `ping 192.168.10.2` to verify connectivity.
- ○ Similarly, you can ping from PC1 to PC0 to ensure successful connection.

1.b - Demonstration of Straight-Through Cabling by Designing a Local Area Network

Objective: To demonstrate the use of straight-through cables in a LAN setup using a switch.

Components Required:

- ● 2 PCs
- ● 1 Switch
- ● Copper Straight-Through Cables

Addressing Table:

- ● PC0: IP Address - 192.168.10.1, Subnet Mask - 255.255.255.0
- ● PC1: IP Address - 192.168.10.2, Subnet Mask - 255.255.255.0

Procedure:

1. **Drag 2 PCs and a Switch into the Console Area:**
   - ○ Open the network simulation tool.
   - ○ Drag and drop two PCs and one switch into the workspace.
2. **Select Connectivity & Copper Straight-Through Cable:**
   - ○ Click on the connectivity options.
   - ○ Select the copper straight-through cable.
3. **Connect PC0 to Switch:**
   - ○ Click on PC0 to get the interface options.
   - ○ Select the Fast Ethernet (Fa0/0) interface.
   - ○ Click on the switch to get the interface options.
   - ○ Select an available Fast Ethernet interface (e.g., Fa0/1).
4. **Connect PC1 to Switch:**
   - ○ Select the copper straight-through cable again.
   - ○ Click on PC1 to get the interface options.
   - ○ Select the Fast Ethernet (Fa0/0) interface.
   - ○ Click on the switch to get the interface options.
   - ○ Select another available Fast Ethernet interface (e.g., Fa0/2).
5. **Configure IP Addresses:**
   - ○ Click on PC0.
   - ○ Go to the Desktop tab.
   - ○ Click on the IP Configuration icon.
   - ○ Configure the IP address 192.168.10.1 and subnet mask 255.255.255.0.
   - ○ Repeat the same procedure for PC1, configuring it with the IP address 192.168.10.2 and subnet mask 255.255.255.0.
6. **Check Logical Connectivity:**

- ○ Click on PC1.
- ○ Go to the Desktop tab.
- ○ Click on the Command Prompt icon.
- ○ Type `ping 192.168.10.1` to verify connectivity.

Lab Exercise 2: Configuration of IP Address in Router

Objective

To demonstrate the configuration of IP address in a router.

Pre-requisite

Understanding of IP Address, range of IP addresses, and classes of IP addresses.

Components Required

- PCs: 2
- Copper cross-over cables: 2
- Router: 1

Addressing Table

Device	Interface	IP Address	Subnet Mask	Gateway
PC0	Fa0/0	192.168.10.2	255.255.255.0	192.168.10.1
PC1	Fa0/0	192.168.11.2	255.255.255.0	192.168.11.1
Router0	GigabitEthernet0/0	192.168.10.1	255.255.255.0	-
Router0	GigabitEthernet0/1	192.168.11.1	255.255.255.0	-

Procedure

1. **Drag 2 PCs and a Router into the Console Area**
    - ○ Open the network simulation software and drag 2 PCs and a router into the console area.
2. **Select Connectivity and Copper Cross-Over Cable**
    - ○ Click on PC0 to get the interface options and select `Fa0/0`.

- ○ Click on Router0 to get the interface options and select GigabitEthernet0/0.
  - ○ Connect PC0 and Router0 using a copper cross-over cable.
3. **Repeat the Connection for PC1**
   - ○ Select the copper cross-over cable again.
   - ○ Click on Router0 to get the interface options and select GigabitEthernet0/1.
   - ○ Click on PC1 to get the interface options and select Fa0/0.
   - ○ Connect PC1 and Router0 using a copper cross-over cable.
4. **Configure IP Address for PC0**
   - ○ Click on PC0.
   - ○ Go to the Desktop tab.
   - ○ Click on the IP Configuration icon.
   - ○ Configure the IP address as 192.168.10.2 with a subnet mask of 255.255.255.0 and the gateway as 192.168.10.1.
5. **Configure IP Address for PC1**
   - ○ Click on PC1.
   - ○ Go to the Desktop tab.
   - ○ Click on the IP Configuration icon.
   - ○ Configure the IP address as 192.168.11.2 with a subnet mask of 255.255.255.0 and the gateway as 192.168.11.1.
6. **Configure IP Address on Router Interfaces**
   - ○ Click on Router0.
   - ○ Go to the Config tab.
   - ○ Select GigabitEthernet0/0 and configure the IP address as 192.168.10.1 with a subnet mask of 255.255.255.0.
   - ○ Select GigabitEthernet0/1 and configure the IP address as 192.168.11.1 with a subnet mask of 255.255.255.0.
7. **Verify the Configuration**
   - ○ To check the connectivity, click on PC0.
   - ○ Go to the Desktop tab.
   - ○ Open the Command Prompt and type ping 192.168.10.1 to test the connection with the router.
   - ○ Repeat the ping test from PC1 to 192.168.11.1.

Exercise 3: Subnetting in WAN Configuration (DTE and DCE)

Objective

The objective of this exercise is to demonstrate the configuration of IP addressing with subnetting in a Wide Area Network (WAN) configuration using Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE).

Pre-requisites

- Understanding of IP addresses and their ranges.
- Familiarity with different classes of IP addresses.
- Knowledge of subnetting.

Components Required

- PCs: 4
- Copper cross-over cables: 4
- Routers: 2
- Serial DCE: 1

Addressing Table

Device	Interface	IP Address	Subnet Mask	Gateway
PC0	Fa0/0	192.168.10.2	255.255.255.224	192.168.10.1
PC1	Fa0/0	192.168.10.34	255.255.255.224	192.168.10.33
PC2	Fa0/0	192.168.10.98	255.255.255.224	192.168.10.97
PC3	Fa0/0	192.168.10.130	255.255.255.224	192.168.10.129
Router0	Gigabit 0/0	192.168.10.1	255.255.255.224	-
Router0	Gigabit 0/1	192.168.10.33	255.255.255.224	-
Router0	Se0/1/0	192.168.10.65	255.255.255.224	-
Router1	Gigabit 0/0	192.168.10.97	255.255.255.224	-
Router1	Gigabit 0/1	192.168.10.129	255.255.255.224	-
Router1	Se0/1/0	192.168.10.66	255.255.255.224	-

Procedure

1. **Setup the PCs and Routers:**
   ○ Drag 4 PCs and 2 routers into the console area.
2. **Connect the devices using copper cross-over cables:**
   ○ Connect each PC to a router using the Fa0/0 interfaces on the PCs and the corresponding GigabitEthernet interfaces on the routers.
3. **Configure IP Addresses on PCs:**
   ○ Configure each PC with the appropriate IP address and subnet mask as listed in the addressing table.
   ○ Example for PC0: IP address 192.168.10.2, subnet mask 255.255.255.224, gateway 192.168.10.1.
4. **Configure IP Addresses on Routers:**
   ○ Configure the GigabitEthernet and Serial interfaces on both routers with the IP addresses and subnet masks as listed.
   ○ Example for Router0 Gigabit 0/0: IP address 192.168.10.1, subnet mask 255.255.255.224.
5. **Enable Routing on Routers:**
   ○ Enable routing on both routers by configuring the appropriate routing protocols or static routes as necessary.
6. **Verify Connectivity:**
   ○ Use the `ping` command from each PC to test connectivity to other PCs and routers in the network.
   ○ Example: From PC0, ping 192.168.10.34 (PC1) to verify connectivity.

Exercise 4: Demonstration of Static and Default Routing

Overview

This exercise focuses on demonstrating the configuration of static and default routing. Static routing is a type of network routing technique where routes are manually entered into the routing table using configuration commands, as opposed to being learned automatically through dynamic routing protocols.

Components Required:

● PCs: 4
● Routers: 2
● Copper cross-over cables: 4
● Serial DCE: 1

Addressing Table:

Device	Interface	IP Address	Subnet Mask	Gateway

PC0	Fa0/0	192.168.10.2	255.255.255.224	192.168.10.1
PC1	Fa0/0	192.168.10.34	255.255.255.224	192.168.10.33
PC2	Fa0/0	192.168.10.98	255.255.255.224	192.168.10.97
PC3	Fa0/0	192.168.10.130	255.255.255.224	192.168.10.129
Router0	Gigabit0/0	192.168.10.1	255.255.255.224	-
Router0	Gigabit0/1	192.168.10.33	255.255.255.224	-
Router0	Se0/1/0	192.168.10.65	255.255.255.224	-
Router1	Gigabit0/0	192.168.10.97	255.255.255.224	-
Router1	Gigabit0/1	192.168.10.129	255.255.255.224	-
Router1	Se0/1/0	192.168.10.66	255.255.255.224	-

Procedure:

Step 1: Setup the Network

1. Drag 4 PCs and 2 routers into the console area.
2. Connect the devices using the appropriate cables:
   ○ Connect the PCs to the routers using Copper cross-over cables.
   ○ Connect the routers to each other using a Serial DCE cable as shown in the figure.

Step 2: Assign IP Addresses

1. Assign IP addresses to the 4 PCs and corresponding router interfaces as gateways.
2. Assign IP addresses to the routers for their respective interfaces as shown in the addressing table.

Step 3: Enable Packet Transmission

1. To enable packet transmission among the devices in the scenario, configure Routing Information Protocol (RIP) routing.

Step 4: Configure RIP Routing

1. Determine the known networks for Router0 and Router1.
2. Only known networks should be configured for RIP routing.
3. To configure RIP routing on Router0:
   ○ Go to Config tab > RIP
   ○ Enter the network address (refer to the known networks table)
   ○ Add the network
   ○ Repeat for the next networks
4. Repeat the same procedure for Router1.

Step 5: Verify Connectivity

1. After configuring RIP routing on both routers, check the connectivity among any two devices using the `ping` command or `tracert` command.

Step 6: Check Routing Table

1. To check the routing table, go to the CLI tab in Router0.
2. Press enter to get the router prompt.
3. Type `enable` or `en` and press enter.
4. Type `show ip route` to display the routing table.

Static Routing Configuration:

If the exercise includes static routing configuration, it involves adding static routes to the routers manually.

Known Networks Table for Static Routing:

Device	Known Networks	Subnet Mask	Unknown Networks	Subnet Mask	Next-hop Address
Router 0	192.168.10.0	255.255.255.224	192.168.10.96	255.255.255.224	192.168.10.66

Router 0	192.168.10.32	255.255.255.224	192.168.10.128	255.255.255.224	192.168.10.66
Router 0	192.168.10.64	255.255.255.224	-	-	-
Router 1	192.168.10.96	255.255.255.224	192.168.10.0	255.255.255.224	192.168.10.65
Router 1	192.168.10.128	255.255.255.224	192.168.10.32	255.255.255.224	192.168.10.65
Router 1	192.168.10.64	255.255.255.224	-	-	-

Steps to Configure Static Routing:

1. On Router0, go to Config tab > Static Routing.
2. Enter the network address, subnet mask, and next-hop address (refer to the table).
3. Repeat for all unknown networks.
4. Repeat the same procedure for Router1.

Exercise 5: Blocking ICMP Ping Request

Objective

To configure network security using two routers by blocking ICMP ping requests using Cisco Packet Tracer.

Procedure

1. **Configure the Router for Interfaces:**
   ○ Set up the network interfaces on each router. Assign IP addresses and subnet masks to each interface to establish basic network connectivity.
2. **Use Static Routing:**
   ○ Establish the path between the routers using static routing. This involves manually setting up routes on each router to direct traffic to the correct networks.

3. **Configure the Standard Access List for Denial of Services:**
   ○ Create an access control list (ACL) to block ICMP ping requests. This ACL will deny ICMP packets, which are used by the ping command, thereby preventing devices from being pinged.
4. **Check the Output Using the Ping Command:**
   ○ Test the network configuration to ensure that the ICMP ping requests are being successfully blocked. This can be done by attempting to ping devices on the network and verifying that the ping requests fail.

Router Configuration :R1
Router>
Router>en
Router#conf t
Router(config)#int fa0/0
Router(config-if)#ip addre 1.0.0.1 255.0.0.0
Router(config-if)#no shut
Router(config-if)#int se0/1/0
Router(config-if)#ip addre 3.0.0.1 255.0.0.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#ip route 2.0.0.0 255.0.0.0 3.0.0.2
Router(config)#access-list 1 deny 2.0.0.2 0.255.255.255
Router(config)#int fa0/0
Router(config-if)#ip access-group 1 out
Router(config-if)#exit
Router(config)#exit
Router#copy run start

Router Configuration :R2
Router>
Router>en
Router#conf t
Router(config)#int fa0/0
Router(config-if)#ip addre 2.0.0.1 255.0.0.0
Router(config-if)#no shut
Router(config-if)#int se0/1/0
Router(config-if)#ip addre 3.0.0.2 255.0.0.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#ip route 1.0.0.0 255.0.0.0 3.0.0.1
Router(config)#exit
Router#copy run start