

Practical 01

IPv4 Addressing and Subnetting

Aim:

- a) Given an IP address and network mask, determine other information about the IP address such as
 - i) Network address
 - ii) Network broadcast address
 - iii) Total number of host bits
 - iv) Number of hosts
 - b) Given an IP address and network mask, determine other information about the IP address such as:
 - i) The subnet address of this subnet
 - ii) The broadcast address of this subnet
 - iii) The range of host addresses for this subnet
 - iv) The maximum number of subnets for this subnet mask
 - v) The number of hosts for each subnet
 - vi) The number of subnet bits
 - vii) The number of this subnet
- Ipv4 Address Is 32 bit Long i.e 4 Bytes.
 - Ipv4 Address are Unique and Universal.
 - Address Space of Ipv4 is 2^{32}
 - Network Address Is identifier of Network.
 - Network Mask:- A Network Mask or a default mask in classful addressing is a 32-bit number with 'n' leftmost list all set to '1' and rightmost are 32-n bits all set to '0'.

Class A
Subnet Mask

Network	Host	Host	Host
255	0	0	0

Class B
Subnet Mask

Network	Network	Host	Host
255	255	0	0

Class C
Subnet Mask

Network	Network	Network	Host
255	255	255	0

- Subnetting:- Dividing the n number into many parts.

It means dividing a large network in 'n' parts is called Subnetting. The network mask is used when the network is subnetted.

But when we divide the network into number of parts then we need to create a subnetwork mask or subnet mask for each subnetwork.

A subnetwork has subnet id and host id.

- ❓ Subnet Mask:- A mask used to determine what subnet an IP address belongs to. An IP address has two components, the network address and the host address. For example, consider the IP address

150.215.017.009. Assuming this is part of a Class B network, the first two numbers (150.215) represent the Class B network address, and the second two numbers (017.009) identify a particular host on this network.

FORMULAS:-

Number Of Address(N):

$$N=2^{32-n}$$

Where n= net id

Number Of Sub-Network:

$$n_{sub}=n+\log_2 S$$

Where n=Length of Net id

n_{sub} =Length of Each Subnet Id

S=Number Of Subnetwork

First Address Is Found By:

1st Address = (Any Address) AND (Network Mask)

Second Address Is Found By:

Last Address = (Any Address) OR (NOT (Network Mask))

Practical 02

Configuring LAN setup

Aim:

- c) Planning and Setting IP networks
- d) Configuring subnet
- e) Study of basic network command and Network configuration commands. ipconfig, netstat, ARP, ping, trace route etc.
- f) Basic network troubleshooting.
- g) Configuration of TCP/IP Protocols in Windows / Linux.
- h) Implementation of Drive/file sharing and printer sharing.

Part a) Planning and Setting IP networks

Planning and setting up IP networks involves several key steps and considerations to ensure a reliable, scalable, and secure infrastructure.

Following points are needed to be considered:

- 1) Define Network Requirements:
We start by understanding the needs of the organization or project. Identify the number of devices to be connected, the expected network traffic, geographical locations, security requirements, and any future expansion plans.
- 2) Choose IP Addressing Scheme:
Decide on the IP addressing scheme we would use, whether it's IPv4 or IPv6. For IPv4, we need to choose a private IP address range and ensure it doesn't conflict with any existing networks we might connect with.
- 3) Design Network Topology:
Determine the network's physical layout and logical topology. Consider factors like the number and location of switches, routers, subnets, and how devices will connect to each other. This design should align with requirements and accommodate potential growth.
- 4) Subnetting:
Divide IP address space into smaller subnets to help manage network traffic efficiently and improve security. Subnetting also enables us to isolate different departments or devices based on their functions.
- 5) Choose Network Equipment:
Select routers, switches, firewalls, and other network equipment based on the network's size, expected traffic load, and the specific features and capabilities needed to meet our requirements.
- 6) IP Address Assignment:
Decide how IP addresses will be assigned to devices. This can be done manually (static IP) for critical devices and servers, or dynamically (DHCP) for less critical devices. DHCP automates IP address assignment and makes it easier to manage larger networks.
- 7) Configure Network Devices:
Set up the routers, switches, and firewalls based on the network design. Configure routing protocols, VLANs (if necessary), security policies, Quality of Service (QoS) settings, and any other required features.

- 8) **Implement Network Security:**
Security is crucial in any network. Set up firewalls, intrusion prevention systems (IPS), and other security measures to protect against unauthorized access and potential threats. Regularly update firmware and keep security patches up to date.
- 9) **Testing and Troubleshooting:**
Before deploying the network in a production environment, conduct thorough testing to identify and resolve any configuration issues or performance bottlenecks. Verify connectivity, test for any security vulnerabilities, and ensure proper functioning of all network services.
- 10) **Documentation:**
Document the entire network setup, including IP addresses, subnet masks, network diagrams, device configurations, security settings, and any other relevant information. This documentation will be valuable for future troubleshooting, maintenance, and upgrades.
- 11) **Monitoring and Maintenance:**
Implement network monitoring tools to keep an eye on the network's health and performance. Regularly monitor for any anomalies, assess network usage patterns, and perform necessary maintenance tasks like updating firmware, renewing SSL certificates, and checking for security updates.
- 12) **Network Scalability:**
Plan for future growth and scalability. As the network expands, we must be ensured it can accommodate additional devices and increased traffic without major disruptions.

Part b) Configuring subnet

In order to configure a subnet, we consider the following example.

A company iSmile has 16 PCs connected in a single network, the company plans to create 4 Subnets each containing 4 PCs

To create four subnetworks, each with four PCs, we can use subnetting to divide the organization's network into smaller segments. We will use a Class C IP address range for this example, as it provides 256 IP addresses in total (ranging from 192.168.0.0 to 192.168.0.255).

First, let's find the subnet mask that allows for four subnets. Since $2^2 = 4$, we need 2 bits for subnetting ($2^2 = 4$). The remaining 6 bits will be used for host addresses ($2^6 = 64 - 2$ reserved for network and broadcast addresses = 62 usable host addresses).

Subnet Mask: 255.255.255.192 (/26 in CIDR notation)

(26 bits for subnet + host, with 26 bits being 1111 1111 1111 1111 1111 1100 0000)

Now, let's assign the IP addresses to each subnet:

Subnet 1:

Usable IP Range: 192.168.0.1 to 192.168.0.62

Network Address: 192.168.0.0

Broadcast Address: 192.168.0.63

Assigned IP Addresses:

PC1	192.168.0.2
PC2	192.168.0.3
PC3	192.168.0.4
PC4	192.168.0.5

Remaining addresses are not assigned

Subnet 2:

Usable IP Range: 192.168.0.65 to 192.168.0.126

Network Address: 192.168.0.64

Broadcast Address: 192.168.0.127.

Assigned IP Addresses:

PC1	192.168.0.65
PC2	192.168.0.66
PC3	192.168.0.67
PC4	192.168.0.68

Remaining addresses are not assigned

Subnet 3:

Usable IP Range: 192.168.0.129 to 192.168.0.190

Network Address: 192.168.0.128

Broadcast Address: 192.168.0.191

Assigned IP Addresses:

PC1	192.168.0.129
PC2	192.168.0.130
PC3	192.168.0.131
PC4	192.168.0.132

Remaining addresses are not assigned

Subnet 4:

Usable IP Range: 192.168.0.193 to 192.168.0.254

Network Address: 192.168.0.192

Broadcast Address: 192.168.0.255

Assigned IP Addresses:

PC1	192.168.0.193
PC2	192.168.0.194
PC3	192.168.0.195
PC4	192.168.0.196

Remaining addresses are not assigned

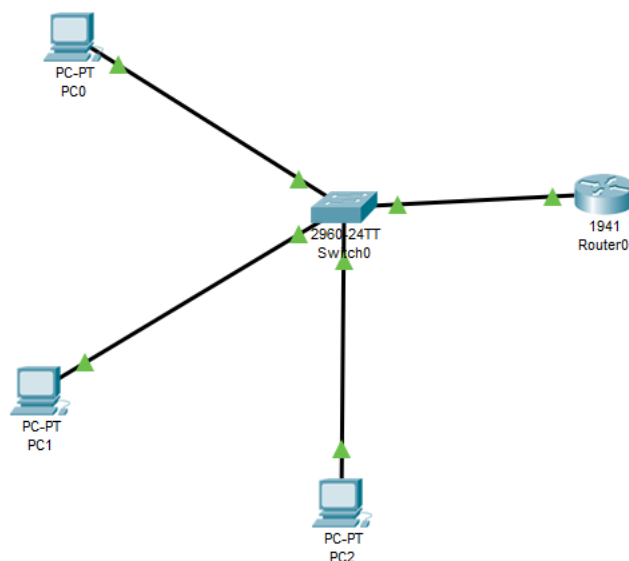
Each subnet will have its own unique range of IP addresses, with 4 usable addresses for PCs (since there are only 4 PCs in each subnet). The remaining addresses in each subnet are reserved for the network address and broadcast address.

Part c) Study of basic network command and Network configuration commands

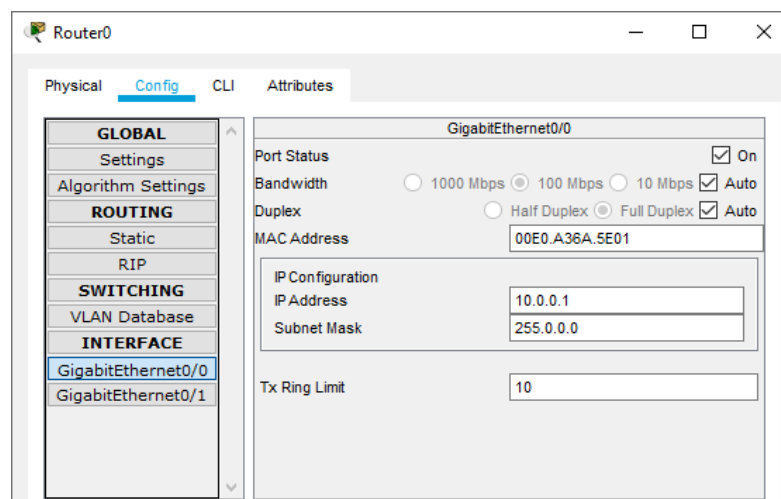
- 1) **arp** : This diagnostic command displays and modifies the IP-to-Ethernetor Token Ring physical address translation tables used by the Address Resolution Protocol (ARP).
- 2) **ipconfig**: This diagnostic command displays all current TCP/IP network configuration values. This command is useful on computers running DHCP because it enables users to determine which TCP/IP configuration values have been configured by DHCP. If you enter only ipconfig without parameters, the response is a display of all of the current TCP/IP configuration values, including IP address, subnet mask, and default gateway.

- 3) **ping:** This diagnostic command verifies connections to one or more remote computers.
- 4) **tracert:**
This diagnostic utility determines the route taken to a destination by sending Internet Control Message Protocol (ICMP) echo packets with varying time-to-live (TTL) values to the destination.

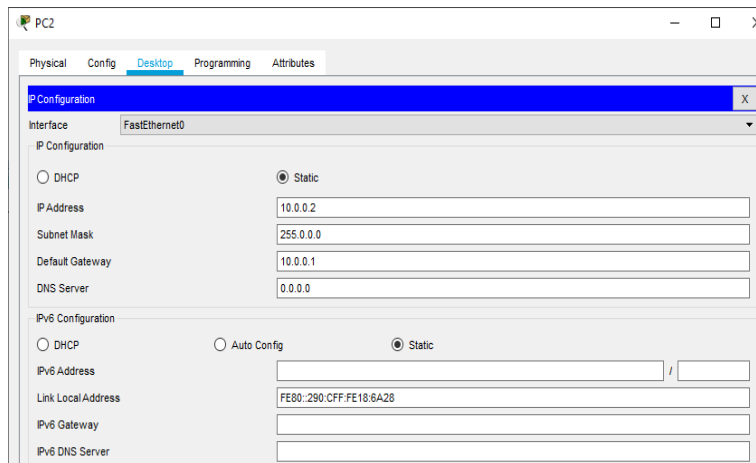
We use the following example to demonstrate the use of the commands discussed in the previous sections



Configure the Router 0:



Configure PC2:



PC2

Physical Config Desktop Programming Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address: 10.0.0.2

Subnet Mask: 255.0.0.0

Default Gateway: 10.0.0.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

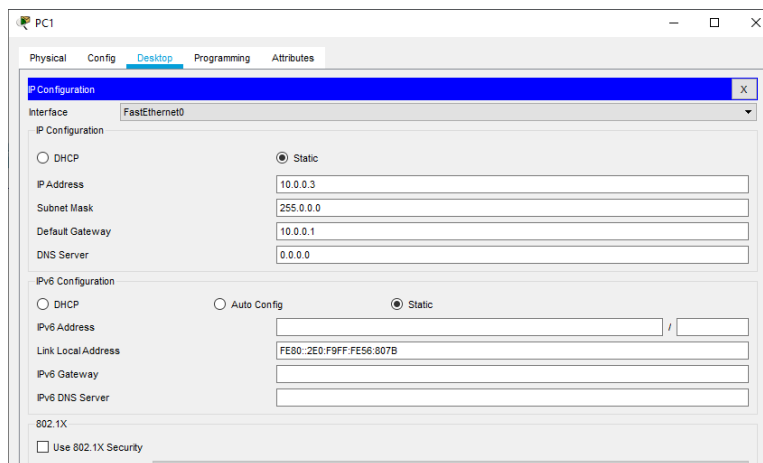
IPv6 Address: /

Link Local Address: FE80::290:CFF:FE18:6A28

IPv6 Gateway:

IPv6 DNS Server:

Configure PC1:



PC1

Physical Config Desktop Programming Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address: 10.0.0.3

Subnet Mask: 255.0.0.0

Default Gateway: 10.0.0.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::2E0:F9FF:FE56:807B

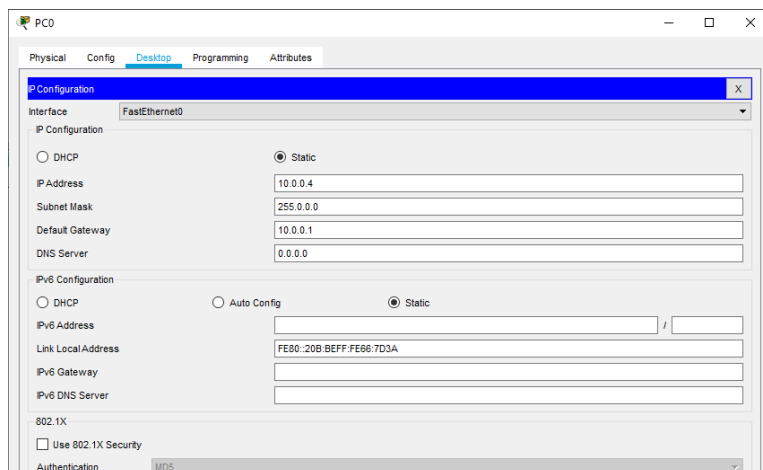
IPv6 Gateway:

IPv6 DNS Server:

802.1X

☐ Use 802.1X Security

Configure PC0:



PC0

Physical Config Desktop Programming Attributes

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address: 10.0.0.4

Subnet Mask: 255.0.0.0

Default Gateway: 10.0.0.1

DNS Server: 0.0.0.0

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address: /

Link Local Address: FE80::20B:BEFF:FE66:7D3A

IPv6 Gateway:

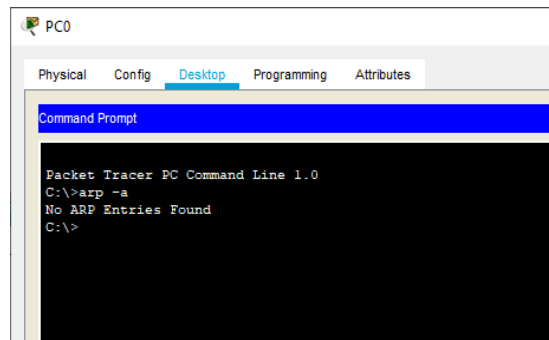
IPv6 DNS Server:

802.1X

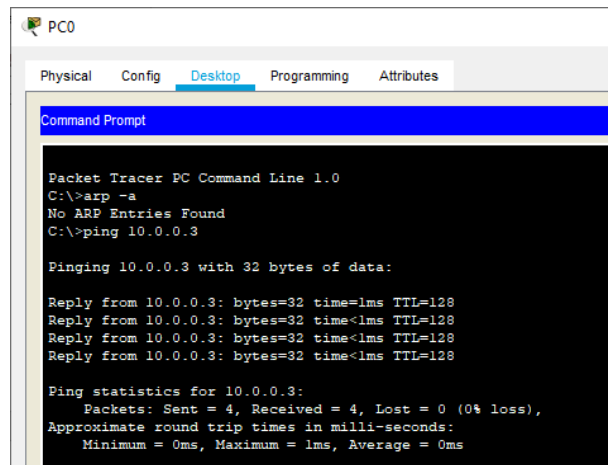
☐ Use 802.1X Security

Authentication: MD5

Next, we type the following commands in PC0



```
PC0
Physical Config Desktop Programming Attributes
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>arp -a
No ARP Entries Found
C:\>
```

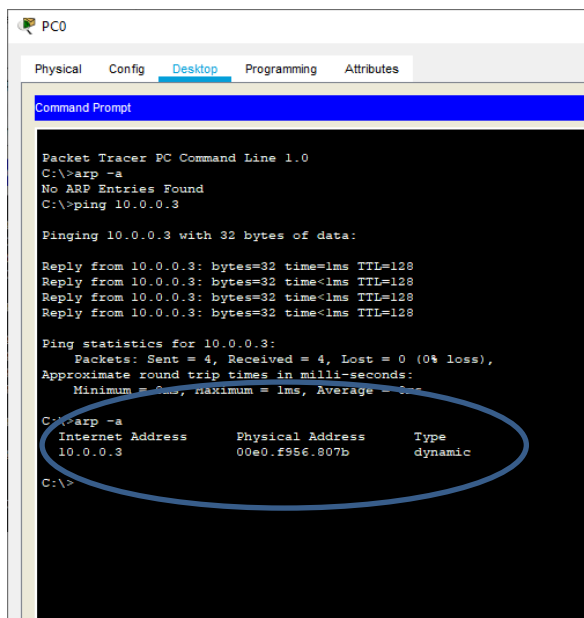


```
PC0
Physical Config Desktop Programming Attributes
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>arp -a
No ARP Entries Found
C:\>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time=1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms
```



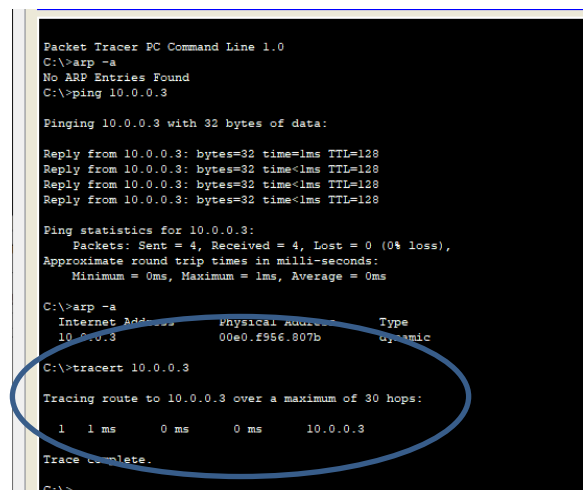
```
PC0
Physical Config Desktop Programming Attributes
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>arp -a
No ARP Entries Found
C:\>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time=1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>arp -a
Internet Address      Physical Address      Type
10.0.0.3              00e0.f956.807b       dynamic
C:\>
```



```
PC0
Physical Config Desktop Programming Attributes
Command Prompt
Packet Tracer PC Command Line 1.0
C:\>arp -a
No ARP Entries Found
C:\>ping 10.0.0.3

Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time=1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128

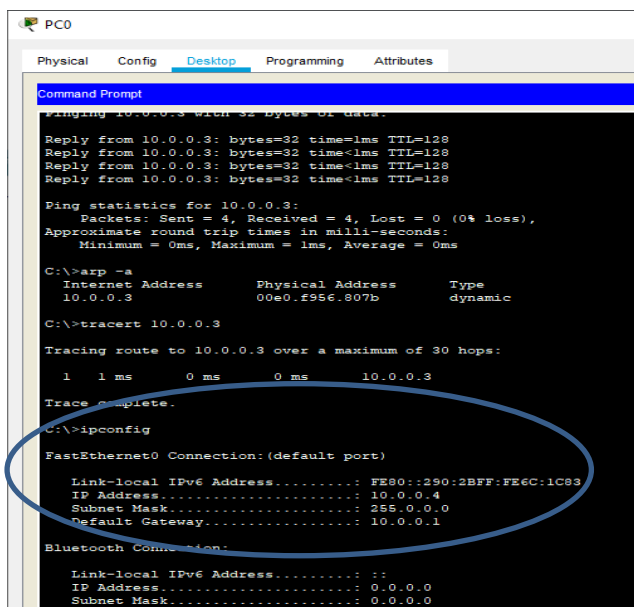
Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>arp -a
Internet Address      Physical Address      Type
10.0.0.3              00e0.f956.807b       dynamic
C:\>tracert 10.0.0.3

Tracing route to 10.0.0.3 over a maximum of 30 hops:

  1  1 ms    0 ms     0 ms    10.0.0.3

Trace complete.
C:\>
```



```
PC0
Physical Config Desktop Programming Attributes
Command Prompt
Pinging 10.0.0.3 with 32 bytes of data:

Reply from 10.0.0.3: bytes=32 time=1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128
Reply from 10.0.0.3: bytes=32 time<1ms TTL=128

Ping statistics for 10.0.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>arp -a
Internet Address      Physical Address      Type
10.0.0.3              00e0.f956.807b       dynamic
C:\>tracert 10.0.0.3

Tracing route to 10.0.0.3 over a maximum of 30 hops:

  1  1 ms    0 ms     0 ms    10.0.0.3

Trace complete.
C:\>ipconfig

FastEthernet0 Connection: (default port)

Link-local IPv6 Address . . . . . : FE80::290:2BFF:FE6C:1C83
IP Address. . . . . : 10.0.0.4
Subnet Mask . . . . . : 255.0.0.0
Default Gateway . . . . . : 10.0.0.1

Bluetooth Connection:

Link-local IPv6 Address . . . . . : ::
IP Address. . . . . : 0.0.0.0
Subnet Mask . . . . . : 0.0.0.0
Default Gateway . . . . . : 0.0.0.0
```


Part d) Basic Network Troubleshooting

Basic network troubleshooting refers to the process of identifying and resolving common issues that can arise in a computer network. Following are some essential steps and techniques for basic network troubleshooting:

- a) **Identify the Problem:** Start by gathering information from the user or by observing the issue yourself. Understand what specific problem the user is facing, such as no internet access, slow connection, or inability to access certain resources.
- b) **Check Physical Connections:** Ensure all network cables are securely plugged in, and network devices like routers, switches, and modems have power and functioning indicators.
- c) **Restart Devices:** Sometimes, network issues can be resolved by simply restarting the network devices. Power cycle the router, modem, and any other network equipment to see if it resolves the problem.
- d) **Check Network Configurations:** Verify the network settings on the computer or device experiencing the issue. Look for correct IP configurations, subnet masks, gateway addresses, and DNS server settings.
- e) **Ping Test:** Use the ping command to check the connectivity between the computer and other devices on the network or the internet. For example, try pinging the router, another computer on the network, or an external website.
- f) **Check for IP Conflicts:** Ensure that there are no IP address conflicts on the network. Two devices with the same IP address can cause communication problems.
- g) **Firewall and Security Software:** Temporarily disable any firewall or security software to check if they are blocking network access.
- h) **Update Network Drivers:** Ensure that the network interface card (NIC) drivers are up to date. Outdated drivers can lead to connectivity issues.
- i) **Test Different Devices:** If possible, try connecting the problematic device to a different network or connecting a different device to the same network to see if the issue persists.
- j) **Check Router and DHCP:** Verify that the router is functioning correctly and that the DHCP server is assigning IP addresses to devices on the network.
- k) **Trace Route:** Use the tracert (Windows) or traceroute (macOS and Linux) command to trace the path from your computer to a remote server or website. This can help identify network hops where there might be an issue.
- l) **Check for Network Outages:** Check with your Internet Service Provider (ISP) or network administrator to see if there are any known network outages or maintenance activities in your area.
- m) **Use Network Troubleshooting Tools:** Network troubleshooting tools like ipconfig, ifconfig, nslookup, and netstat can provide valuable information about network configurations and connections.
- n) **Check Physical Environment:** Ensure that there are no physical obstructions or interference (e.g., walls, microwave ovens) that could affect wireless network connectivity.

Part e) Networks Implementation of Drive/file sharing and printer sharing

Implementing drive/file sharing and printer sharing in a network allows multiple users to access shared files and use shared printers efficiently. These features can be set up on both small local networks (e.g., home networks) and larger corporate networks.

Implementing drive/file sharing and printer sharing in a Windows-based network as follows:

Set Up File Sharing:

File sharing allows users to access files and folders stored on a central server or on individual computers across the network.

Step 1: Share Folders:

Right-click on the folder you want to share and select "Properties."

In the Properties window, go to the "Sharing" tab.

Click on "Advanced Sharing" and check the box for "Share this folder."

Assign a Share Name (also known as a "Share Name" or "Share Path") that other users will use to access the shared folder.

You can set permissions to control who can access the folder and what level of access they have (read-only, read/write, etc.).

Step 2: Access Shared Folders:

Open File Explorer on another computer connected to the network.

In the address bar, type \\<IP address or computer name of the shared folder> and press Enter.

You should see a list of shared folders on that computer. Double-click on the folder you want to access and enter the appropriate credentials if required.

Set Up Printer Sharing:

Printer sharing allows multiple users to print to a single printer connected to a computer on the network.

Step 1: Share the Printer:

Connect the printer to the computer you want to use as a print server (the computer that will share the printer).

Open the Control Panel and go to "Devices and Printers."

Right-click on the printer you want to share and select "Printer properties."

In the properties window, go to the "Sharing" tab.

Check the box for "Share this printer" and provide a Share Name for the printer.

Step 2: Connect to the Shared Printer:

On other computers connected to the network, open the Control Panel and go to "Devices and Printers."

Click on "Add a printer" and then select "Add a network, wireless, or Bluetooth printer."

The shared printer should appear in the list. Select it and follow the on-screen instructions to install the printer driver and connect to the shared printer.

Practical 03

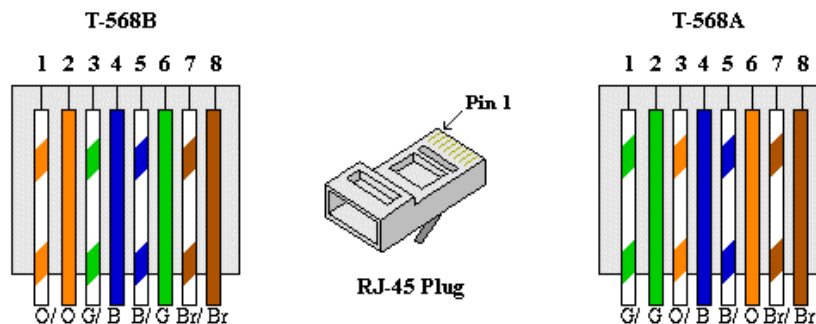
Colour code for crimping LAN (Cat 5/6/7) cable

Aim:

- i) Study of Different colour codes
- j) Study of different connecting devices and their differences
- k) Crimping LAN Cable

RJ45 Pin-out Ethernet Cables and Colour codes

Ethernet LAN cables can come in two types – Crossover or Straight through. The following are the pin-outs for the RJ45 connectors



There are two different pin-out standards used worldwide, and depending on location, we determine which one to use.

T568A is used in America and Asia and

T568B is used in Britain and Europe

Different connecting devices and their differences:

There are several different connecting devices used in computer networks. Here are the most common ones and their key differences:

- 1) Hubs:
 - a) Hubs operate at the physical layer of the network.
 - b) They have a single collision domain, meaning all connected devices share the same bandwidth.
 - c) They broadcast incoming data to all connected devices, regardless of the intended recipient.
 - d) Hubs are considered outdated and are rarely used in modern networks.
- 2) Switches:
 - a) Switches operate at the data link layer of the network.
 - b) They create individual collision domains for each connected device, allowing for simultaneous communication.
 - c) Switches use MAC addresses to direct incoming data to the appropriate device.
 - d) They offer better performance, security, and scalability compared to hubs.
- 3) Routers:
 - a) Routers operate at the network layer of the network.

- b) They connect multiple networks or subnets and forward data packets between them.
 - c) Routers use IP addresses to route traffic based on network protocols.
 - d) They provide network segmentation, enable interconnectivity, and enforce security policies.
- 4) Bridges:
- a) Bridges operate at the data link layer of the network.
 - b) They connect two network segments and filter network traffic based on MAC addresses.
 - c) Bridges help to reduce network congestion and improve overall network performance.
 - d) They are commonly used to extend network coverage and create smaller broadcast domains.
- 5) Repeaters and Extenders:
- a) Repeaters and extenders amplify or regenerate network signals to extend their reach.
 - b) Repeaters operate at the physical layer, while extenders work at higher layers.
 - c) Repeaters boost analog signals, while extenders can amplify both analog and digital signals.
 - d) Repeaters and extenders are primarily used in long-distance or large-scale network deployments.

Crimping LAN Cable

Crimping LAN wires, also known as Ethernet cables, involves attaching RJ-45 connectors to the ends of the cable. Here are the steps to crimp LAN wires:

1) To Gather the necessary tools and materials:

- a) Ethernet cable (UTP or STP)



- b) RJ-45 connectors (usually 8P8C)



- c) Crimping tool



d) Cable cutter/stripper



OR

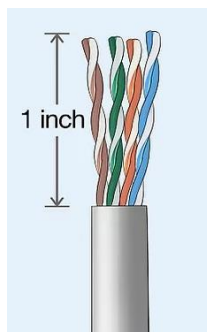


e) Cable tester (Optional)



2) Measure and cut the cable:

Determine the desired length of the LAN wire and cut the cable accordingly. Use a cable cutter to make a clean, straight cut.



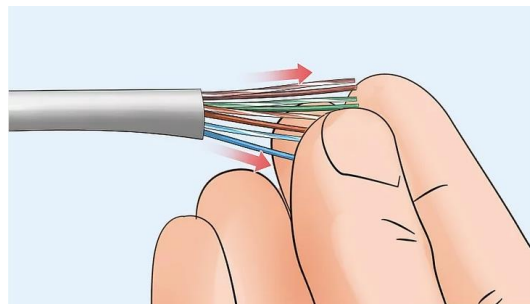
3) Strip the cable jacket:

Use a cable stripper or a sharp blade to carefully remove approximately 1-1.5 inches (2.5-3.8 cm) of the outer jacket from the cut end of the cable. Be cautious not to damage the internal wires.



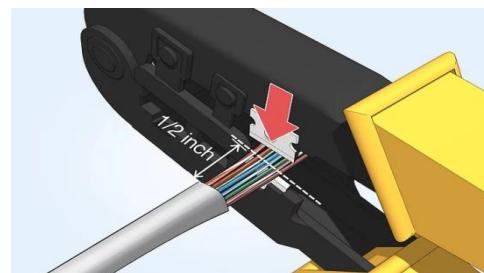
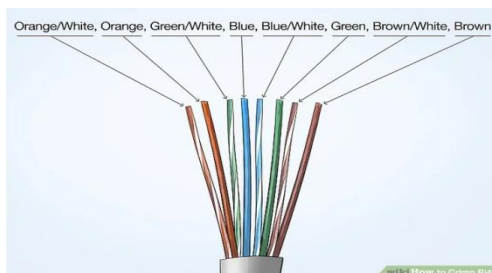
4) Untwist and arrange the wires:

After removing the jacket, you'll find four twisted pairs of coloured wires inside. Untwist the pairs and arrange them according to the desired wiring standard (T568A). Make sure to maintain the same order on both ends of the cable.



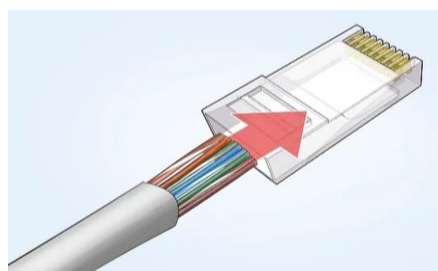
5) Trim and straighten the wires:

Cut the excess wire length to ensure they are even and of equal length, typically around 0.5 inches (1.3 cm). Use your fingers or a wire straightened tool to align the wires neatly and make them easier to insert into the connector.



6) Insert the wires into the connector:

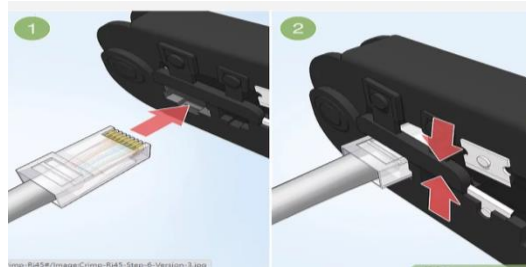
Carefully insert the arranged wires into the RJ-45 connector, ensuring they reach the end and make contact with the metal contacts inside. Check that the wire colours are in the correct order.



7) Crimp the connector:

Place the connector and cable into the appropriate slot of the crimping tool, ensuring it is properly aligned.

Squeeze the handles of the crimping tool firmly to crimp the connector. This action will secure the wires in place and create a strong connection.



8) Repeat for the other end:

Repeat steps 3 to 7 for the other end of the LAN wire, ensuring that both ends follow the same wiring standard.

9) Test the cable (optional):

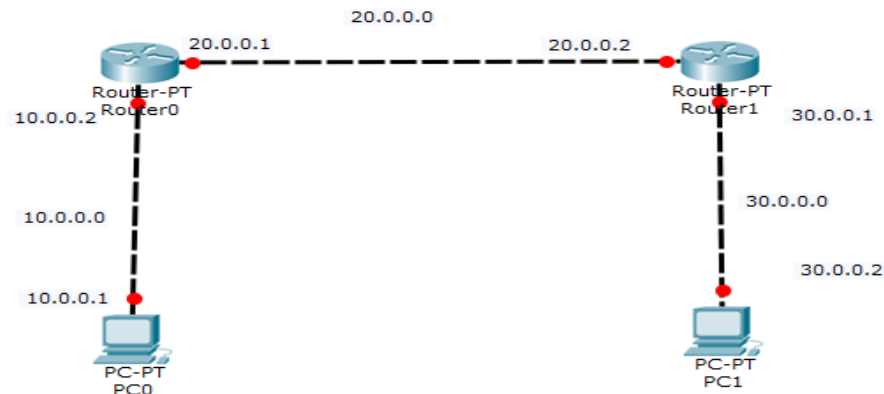
If available, use a cable tester to verify the connectivity and integrity of the crimped LAN wire. The tester will check for proper wire order and continuity.

By following these steps, we can crimp LAN wires and create custom Ethernet cables as per network requirements.

Practical 04

Designing and configuring a network topology

Aim: Configure IP static routing



Assigning IP Address to PC0:

Open>>PC-PT-PC0>>Desktop>>IP Configuration>>IP Address>>10.0.0.1>>Default Gateway>>10.0.0.2

Physical Config Desktop Attributes Software/Services

IP Configuration

☐ DHCP ☒ Static

IP Address: 10.0.0.1

Subnet Mask: 255.0.0.0

Default Gateway: 10.0.0.2

DNS Server:

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

Assigning IP Address to PC1:

Open>>PC-PT-PC3>>Desktop>>IP Configuration>>IP Address>>30.0.0.1>>Default Gateway>>30.0.0.2

Physical Config Desktop Attributes Software/Services

IP Configuration

☐ DHCP ☒ Static

IP Address: 30.0.0.2

Subnet Mask: 255.0.0.0

Default Gateway: 30.0.0.1

DNS Server:

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

Assigning IP address to Router0>>FastEthernet0/0:

Open>>Router-PT Router0>>Config>>FastEthernet0/0>>IP Address>>20.0.0.1>>Subnet Mask>>255.0.0.0

The screenshot shows the configuration window for the FastEthernet0/0 interface on Router0. The 'Config' tab is selected. On the left, a tree view shows the hierarchy: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, INTERFACE, FastEthernet0/0 (selected), and FastEthernet1/0. The main area displays the configuration for FastEthernet0/0. The 'Port Status' is checked 'On'. 'Bandwidth' is set to '100 Mbps' and 'Auto'. 'Duplex' is set to 'Half Duplex' and 'Auto'. The 'MAC Address' is '00E0.8FC4.D2E1'. Under 'IP Configuration', the 'IP Address' is '20.0.0.1' and the 'Subnet Mask' is '255.0.0.0'.

Assigning IP address to Router0>>FastEthernet1/0:

Open>>Router-PT Router0>>Config>>FastEthernet1/0>>IP Address>>10.0.0.2>>Subnet Mask>>255.0.0.0

The screenshot shows the configuration window for the FastEthernet1/0 interface on Router0. The 'Config' tab is selected. On the left, a tree view shows the hierarchy: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, INTERFACE, FastEthernet0/0, and FastEthernet1/0 (selected). The main area displays the configuration for FastEthernet1/0. The 'Port Status' is checked 'On'. 'Bandwidth' is set to '100 Mbps' and 'Auto'. 'Duplex' is set to 'Half Duplex' and 'Auto'. The 'MAC Address' is '00E0.F96A.5B11'. Under 'IP Configuration', the 'IP Address' is '10.0.0.2' and the 'Subnet Mask' is '255.0.0.0'.

Assigning IP address to Router1>>FastEthernet0/0:

Open>>Router-PT Router1>>Config>>FastEthernet0/0>>IP Address>>20.0.0.2>>Subnet Mask>>255.0.0.0

The screenshot shows the configuration window for the FastEthernet0/0 interface on Router1. The 'Config' tab is selected. On the left, a tree view shows the hierarchy: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, INTERFACE, FastEthernet0/0 (selected), and FastEthernet1/0. The main area displays the configuration for FastEthernet0/0. The 'Port Status' is checked 'On'. 'Bandwidth' is set to '100 Mbps' and 'Auto'. 'Duplex' is set to 'Full Duplex' and 'Auto'. The 'MAC Address' is '0060.702C.C40D'. Under 'IP Configuration', the 'IP Address' is '20.0.0.2' and the 'Subnet Mask' is '255.0.0.0'.

Assigning IP address to Router1>>FastEthernet1/0:

Open>>Router-PT Router1>>Config>>FastEthernet1/0>>IP Address>>30.0.0.1>>Subnet Mask>>255.0.0.0

Physical	Config	CLI	Attributes
<div>GLOBAL</div> <div>Settings</div> <div>Algorithm Settings</div> <div>ROUTING</div> <div>Static</div> <div>RIP</div> <div>INTERFACE</div> <div>FastEthernet0/0</div> <div>FastEthernet1/0</div>			
<div>FastEthernet1/0</div> <div>Port Status <input checked="" type="checkbox"/> On</div> <div>Bandwidth <input checked="" type="radio"/> 100 Mbps <input type="radio"/> 10 Mbps <input checked="" type="checkbox"/> Auto</div> <div>Duplex <input checked="" type="radio"/> Half Duplex <input type="radio"/> Full Duplex <input checked="" type="checkbox"/> Auto</div> <div>MAC Address 0001.9691.7D1B</div> <div>IP Configuration</div> <div>IP Address 30.0.0.1</div> <div>Subnet Mask 255.0.0.0</div>			

Assigning routes using static IP in router0:

Open>>Router-PT
Router0>>Config>>Static>>Network>30.0.0.0>>Mask>>255.0.0.0>>Next Hop>>20.0.0.2>>Add

Physical	Config	CLI	Attributes
<div>GLOBAL</div> <div>Settings</div> <div>Algorithm Settings</div> <div>ROUTING</div> <div>Static</div> <div>RIP</div> <div>INTERFACE</div> <div>FastEthernet0/0</div> <div>FastEthernet1/0</div> <div>Serial2/0</div> <div>Serial3/0</div> <div>FastEthernet4/0</div> <div>FastEthernet5/0</div>			
<div>Static Routes</div> <div>Network 30.0.0.0</div> <div>Mask 255.0.0.0</div> <div>Next Hop 20.0.0.2</div> <div>Add</div> <div>Network Address</div> <div>30.0.0.0/8 via 20.0.0.2</div> <div>Remove</div>			

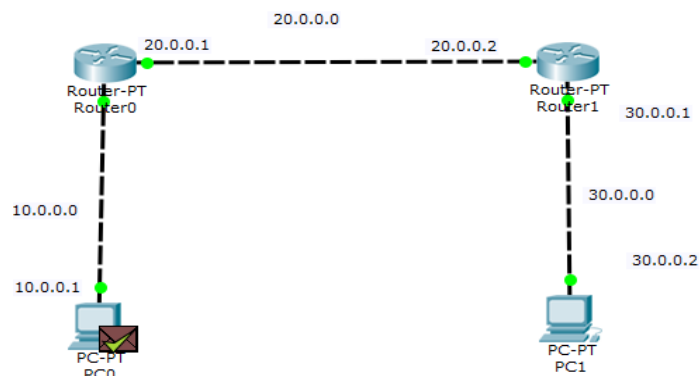
Assigning routes using static IP in router1

Open>>Router-PT

Router1>>Config>>Static>>Network>10.0.0.0>>Mask>>255.0.0.0>>Next Hop>>20.0.0.1>>Add

Physical	Config	CLI	Attributes
Static Routes			
Network <input type="text" value="10.0.0.0"/>			
Mask <input type="text" value="255.0.0.0"/>			
Next Hop <input type="text" value="20.0.0.1"/>			
<input type="button" value="Add"/>			
Network Address 10.0.0.0/8 via 20.0.0.1			
<input type="button" value="Remove"/>			

Sending Message:



Successful:

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit
	Successful	PC0	PC1	ICMP		0.000	N	0	(e...

Verifying the Connectivity using the Ping command:

```
Command Prompt
Pinging 30.0.0.2 with 32 bytes of data:
Request timed out.
Request timed out.
Reply from 30.0.0.2: bytes=32 time=0ms TTL=126
Reply from 30.0.0.2: bytes=32 time=0ms TTL=126

Ping statistics for 30.0.0.2:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC>ping 30.0.0.2

Pinging 30.0.0.2 with 32 bytes of data:
Reply from 30.0.0.2: bytes=32 time=1ms TTL=126
Reply from 30.0.0.2: bytes=32 time=0ms TTL=126
Reply from 30.0.0.2: bytes=32 time=0ms TTL=126
Reply from 30.0.0.2: bytes=32 time=0ms TTL=126

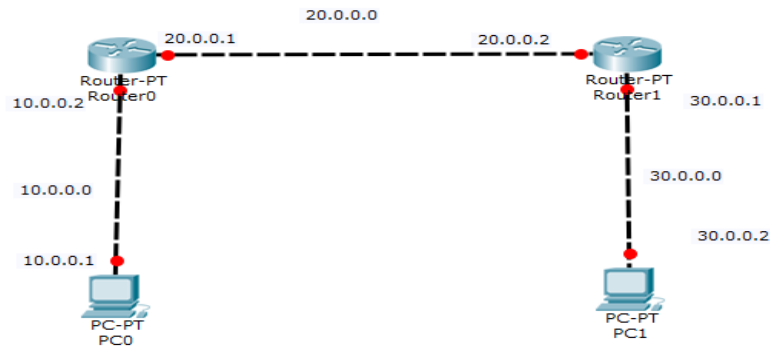
Ping statistics for 30.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>
```

Practical 05

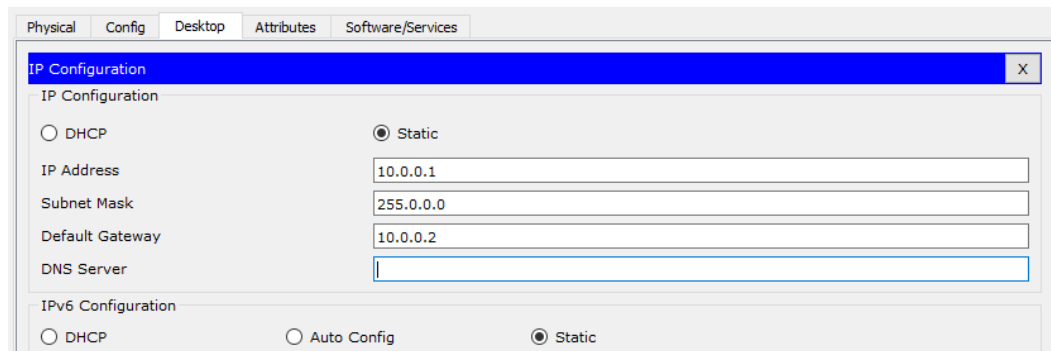
Configure IP routing using RIP

Aim: Configure IP routing using Routing Information Protocol (RIP)



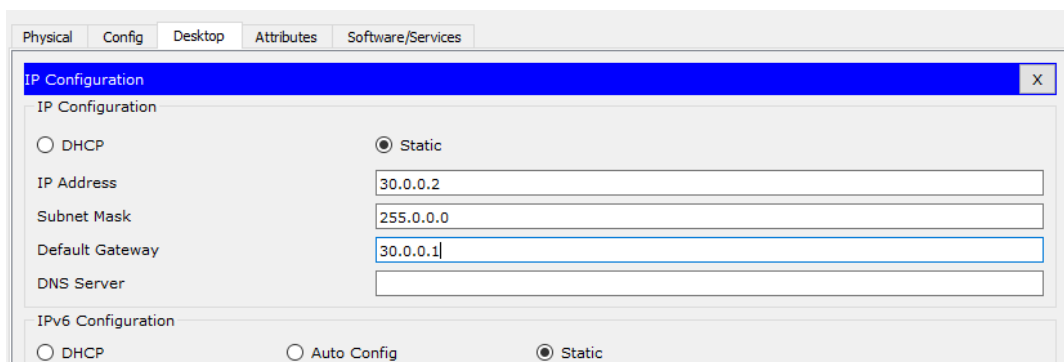
Assigning IP Address to PC0:

Open>>PC-PT-PC0>>Desktop>>IP Configuration>>IP Address>>10.0.0.1>>Default Gateway>>10.0.0.2



Assigning IP Address to PC1:

Open>>PC-PT-PC3>>Desktop>>IP Configuration>>IP Address>>30.0.0.1>>Default Gateway>>30.0.0.2



Assigning IP address to Router0>>FastEthernet0/0:

Open>>Router-PT Router0>>Config>>FastEthernet0/0>>IP Address>>20.0.0.1>>Subnet Mask>>255.0.0.0

The screenshot shows the configuration window for Router0, specifically the FastEthernet0/0 interface. The 'Config' tab is selected. On the left, a tree view shows the configuration hierarchy: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, INTERFACE, FastEthernet0/0 (selected), and FastEthernet1/0. The main area displays the configuration for FastEthernet0/0. The 'Port Status' is checked 'On'. 'Bandwidth' is set to '100 Mbps' and 'Auto'. 'Duplex' is set to 'Half Duplex' and 'Auto'. The 'MAC Address' is '00E0.8FC4.D2E1'. Under 'IP Configuration', the 'IP Address' is '20.0.0.1' and the 'Subnet Mask' is '255.0.0.0'.

Assigning IP address to Router0>>FastEthernet1/0:

Open>>Router-PT Router0>>Config>>FastEthernet1/0>>IP Address>>10.0.0.2>>Subnet Mask>>255.0.0.0

The screenshot shows the configuration window for Router0, specifically the FastEthernet1/0 interface. The 'Config' tab is selected. On the left, a tree view shows the configuration hierarchy: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, INTERFACE, FastEthernet0/0, and FastEthernet1/0 (selected). The main area displays the configuration for FastEthernet1/0. The 'Port Status' is checked 'On'. 'Bandwidth' is set to '100 Mbps' and 'Auto'. 'Duplex' is set to 'Half Duplex' and 'Auto'. The 'MAC Address' is '00E0.F96A.5B11'. Under 'IP Configuration', the 'IP Address' is '10.0.0.2' and the 'Subnet Mask' is '255.0.0.0'.

Assigning IP address to Router1>>FastEthernet0/0:

Open>>Router-PT Router1>>Config>>FastEthernet0/0>>IP Address>>20.0.0.2>>Subnet Mask>>255.0.0.0

The screenshot shows the configuration window for Router1, specifically the FastEthernet0/0 interface. The 'Config' tab is selected. On the left, a tree view shows the configuration hierarchy: GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, INTERFACE, FastEthernet0/0 (selected), and FastEthernet1/0. The main area displays the configuration for FastEthernet0/0. The 'Port Status' is checked 'On'. 'Bandwidth' is set to '100 Mbps' and 'Auto'. 'Duplex' is set to 'Full Duplex' and 'Auto'. The 'MAC Address' is '0060.702C.C40D'. Under 'IP Configuration', the 'IP Address' is '20.0.0.2' and the 'Subnet Mask' is '255.0.0.0'.

Assigning IP address to Router1>>FastEthernet1/0:

Open>>Router-PT Router1>>Config>>FastEthernet1/0>>IP Address>>30.0.0.1>>Subnet Mask>>255.0.0.0

Physical Config CLI Attributes

FastEthernet1/0

Port Status ☒ On

Bandwidth ☒ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☒ Half Duplex ☐ Full Duplex ☒ Auto

MAC Address 0001.9691.7D1B

IP Configuration

IP Address 30.0.0.1

Subnet Mask 255.0.0.0

Assigning routes using RIP in Router0:

Open>>Router-PT Router0>>Config>>RIP>>Network>20.0.0.0>>Add>>10.0.0.0>>Add

Physical Config CLI Attributes

RIP Routing

Network Add

Network Address

10.0.0.0

20.0.0.0

Remove

Assigning routes using RIP in Router1:

Open>>Router-PT Router1>>Config>>RIP>>Network>30.0.0.0>>Add>>20.0.0.0>>Add

Physical Config CLI Attributes

RIP Routing

Network Add

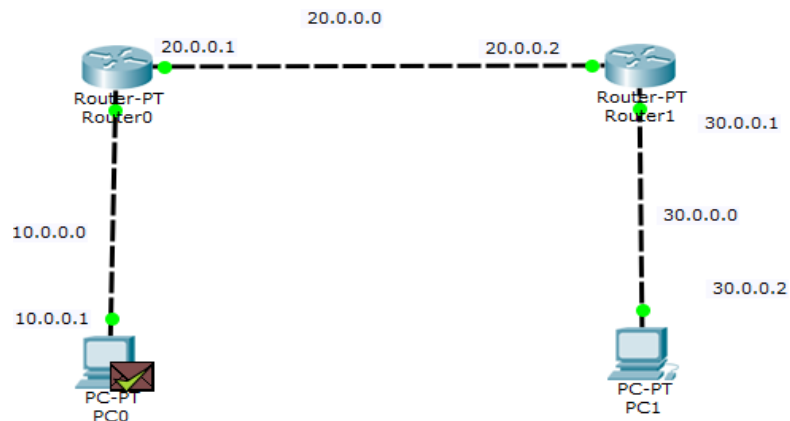
Network Address

20.0.0.0

30.0.0.0

Remove

Sending Message:



Successful:

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit
	Successful	PC0	PC1	ICMP		0.000	N	0	(e...

Verifying the Connectivity using the Ping command:

```
Command Prompt
Pinging 30.0.0.2 with 32 bytes of data:
Request timed out.
Request timed out.
Reply from 30.0.0.2: bytes=32 time=0ms TTL=126
Reply from 30.0.0.2: bytes=32 time=0ms TTL=126

Ping statistics for 30.0.0.2:
    Packets: Sent = 4, Received = 2, Lost = 2 (50% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

PC>ping 30.0.0.2

Pinging 30.0.0.2 with 32 bytes of data:

Reply from 30.0.0.2: bytes=32 time=1ms TTL=126
Reply from 30.0.0.2: bytes=32 time=0ms TTL=126
Reply from 30.0.0.2: bytes=32 time=0ms TTL=126
Reply from 30.0.0.2: bytes=32 time=0ms TTL=126

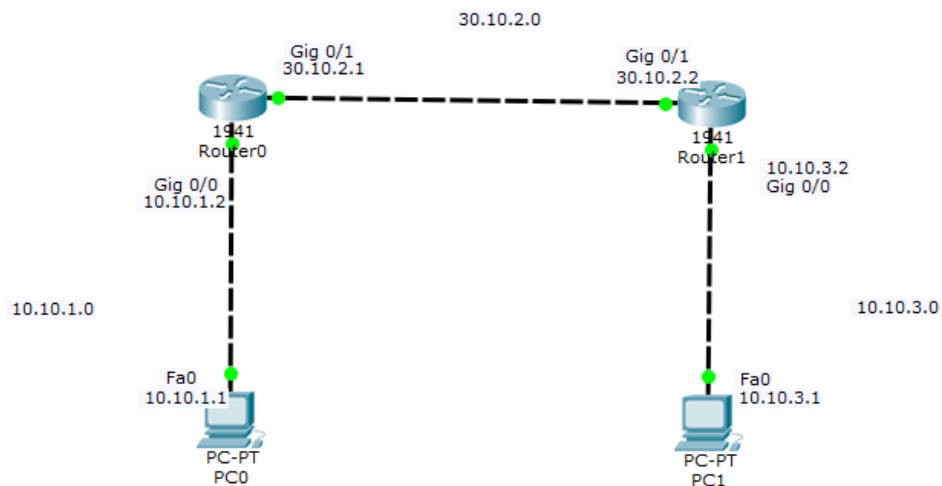
Ping statistics for 30.0.0.2:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 1ms, Average = 0ms

PC>
```

Practical 06(A)

Configuring Simple OSPF

Aim: Configuring Simple OSPF.



Assigning IP Address To PC 0:

Open>>PC0>>Desktop>>Ipconfiguration>> Ip Address >> 10.10.1.1 >> subnetmask >> 255.0.0.0>>default gateway>>10.10.1.2

The screenshot shows the IP Configuration window for PC0. The 'Static' radio button is selected. The IP Address is set to 10.10.1.1, the Subnet Mask is 255.0.0.0, and the Default Gateway is 10.10.1.2. The DNS Server field is empty.

IP Configuration	
<input type="radio"/> DHCP <input checked="" type="radio"/> Static	
IP Address	10.10.1.1
Subnet Mask	255.0.0.0
Default Gateway	10.10.1.2
DNS Server	

Assigning IP Address To PC 1:

Open>>PC0>>Dekstop>>Ipconfiguration>>Ipaddress>>10.10.3.1>>subnetmask>>255.0.0.0 >>default gateway>>10.10.3.2

The screenshot shows the IP Configuration window for PC1. The 'Static' radio button is selected. The IP Address is set to 10.10.3.1, the Subnet Mask is 255.0.0.0, and the Default Gateway is 10.10.3.2. The DNS Server field is empty.

IP Configuration	
<input type="radio"/> DHCP <input checked="" type="radio"/> Static	
IP Address	10.10.3.1
Subnet Mask	255.0.0.0
Default Gateway	10.10.3.2
DNS Server	

Assigning IP Address To Router 0 :

Open>>Router0>>config>>GigabitEthernet0/0>>ipconfiguration>>ipaddress>>10.10.1.2>>
subnetmask>>255.0.0.0>>Port>> ON

Physical	Config	CLI	Attributes
<div>GLOBAL</div> <div>Settings</div> <div>Algorithm Settings</div> <div>ROUTING</div> <div>Static</div> <div>RIP</div> <div>SWITCHING</div> <div>VLAN Database</div> <div>INTERFACE</div> <div>GigabitEthernet0/0</div> <div>GigabitEthernet0/1</div>			
<div>GigabitEthernet0/0</div> <div>Port Status <input checked="" type="checkbox"/> On</div> <div>Bandwidth <input checked="" type="radio"/> 1000 Mbps <input type="radio"/> 100 Mbps <input type="radio"/> 10 Mbps <input checked="" type="checkbox"/> Auto</div> <div>Duplex <input checked="" type="radio"/> Half Duplex <input type="radio"/> Full Duplex <input checked="" type="checkbox"/> Auto</div> <div>MAC Address 00D0.5813.0801</div> <div>IP Configuration</div> <div>IP Address 10.10.1.2</div> <div>Subnet Mask 255.0.0.0</div> <div>Tx Ring Limit 10</div>			

Open>>Router0>>config>>GigabitEthernet0/1>>ipconfiguration>>ipaddress>>30.10.2.1>>
subnetmask>>255.0.0.0>>Port>> ON

Physical	Config	CLI	Attributes
<div>GLOBAL</div> <div>Settings</div> <div>Algorithm Settings</div> <div>ROUTING</div> <div>Static</div> <div>RIP</div> <div>SWITCHING</div> <div>VLAN Database</div> <div>INTERFACE</div> <div>GigabitEthernet0/0</div> <div>GigabitEthernet0/1</div>			
<div>GigabitEthernet0/1</div> <div>Port Status <input checked="" type="checkbox"/> On</div> <div>Bandwidth <input checked="" type="radio"/> 1000 Mbps <input type="radio"/> 100 Mbps <input type="radio"/> 10 Mbps <input checked="" type="checkbox"/> Auto</div> <div>Duplex <input checked="" type="radio"/> Half Duplex <input type="radio"/> Full Duplex <input checked="" type="checkbox"/> Auto</div> <div>MAC Address 00D0.5813.0802</div> <div>IP Configuration</div> <div>IP Address 30.10.2.1</div> <div>Subnet Mask 255.0.0.0</div> <div>Tx Ring Limit 10</div>			

Assigning IP Address To Router 1:

Open>>Router1>>config>>GigabitEthernet0/0>>ipconfiguration>>ipaddress>>10.10.3.2>>
subnetmask>>255.0.0.0>>Port>>ON

Physical	Config	CLI	Attributes
<div>GLOBAL</div> <div>Settings</div> <div>Algorithm Settings</div> <div>ROUTING</div> <div>Static</div> <div>RIP</div> <div>SWITCHING</div> <div>VLAN Database</div> <div>INTERFACE</div> <div>GigabitEthernet0/0</div> <div>GigabitEthernet0/1</div>			
<div>GigabitEthernet0/0</div> <div>Port Status <input checked="" type="checkbox"/> On</div> <div>Bandwidth <input checked="" type="radio"/> 1000 Mbps <input type="radio"/> 100 Mbps <input type="radio"/> 10 Mbps <input checked="" type="checkbox"/> Auto</div> <div>Duplex <input checked="" type="radio"/> Half Duplex <input type="radio"/> Full Duplex <input checked="" type="checkbox"/> Auto</div> <div>MAC Address 0060.4703.7101</div> <div>IP Configuration</div> <div>IP Address 10.10.3.2</div> <div>Subnet Mask 255.0.0.0</div> <div>Tx Ring Limit 10</div>			

Open>>Router1>>config>>GigabitEthernet0/1>>ipconfiguration>>ipaddress>>30.10.2.2>>subnetmask>>255.0.0.0>>Port>> ON

Physical	Config	CLI	Attributes
<div><div>GLOBAL</div><div>Settings</div><div>Algorithm Settings</div><div>ROUTING</div><div>Static</div><div>RIP</div><div>SWITCHING</div><div>VLAN Database</div><div>INTERFACE</div><div>GigabitEthernet0/0</div><div>GigabitEthernet0/1</div></div> <div><div>GigabitEthernet0/1</div><div>Port Status <input checked="" type="checkbox"/> On</div><div>Bandwidth <input checked="" type="radio"/> 1000 Mbps <input type="radio"/> 100 Mbps <input type="radio"/> 10 Mbps <input checked="" type="checkbox"/> Auto</div><div>Duplex <input type="radio"/> Half Duplex <input checked="" type="radio"/> Full Duplex <input checked="" type="checkbox"/> Auto</div><div>MAC Address 0060.4703.7102</div><div>IP Configuration</div><div>IP Address 30.10.2.2</div><div>Subnet Mask 255.0.0.0</div><div>Tx Ring Limit 10</div></div>			

Configuring OSPF ON Router 0 & Router 1:-

Router 0 CLI::

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 10.10.1.0 255.0.0.0 area 0
Router(config-router)#network 30.10.2.0 255.0.0.0 area 0
Router(config-router)#exit
Router(config)#exit
Router#
```

Router 1 CLI::

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 30.10.2.0 255.0.0.0 area 0
Router(config-router)#network 10.10.3.0 255.0.0.0 area 0
Router(config-router)#exit
Router(config)#exit
Router#
```

OUTPUT:-

Goto R0:CLI

Router#sh ip ospf

```
Router#sh ip ospf
Routing Process "ospf 1" with ID 30.10.2.1
Supports only single TOS(TOS0) routes
Supports opaque LSA
SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs
Number of external LSA 0. Checksum Sum 0x000000
Number of opaque AS LSA 0. Checksum Sum 0x000000
Number of DCbitless external and opaque AS LSA 0
Number of DoNotAge external and opaque AS LSA 0
Number of areas in this router is 1. 1 normal 0 stub 0 nssa
External flood list length 0
  Area BACKBONE(0)
    Number of interfaces in this area is 2
    Area has no authentication
    SPF algorithm executed 4 times
    Area ranges are
    Number of LSA 3. Checksum Sum 0x0135a9
    Number of opaque link LSA 0. Checksum Sum 0x000000
    Number of DCbitless LSA 0
    Number of indication LSA 0
    Number of DoNotAge LSA 0
    Flood list length 0
..
|
```

Router#sh ip ospf neighbour

Router#sh ip ospf database

Router#sh ip ospf neighbor

Neighbor ID	Pri	State	Dead Time	Address
Interface				
30.10.2.2	1	FULL/BDR	00:00:31	30.10.2.2
GigabitEthernet0/1				

Router#sh ip ospf database

OSPF Router with ID (30.10.2.1) (Process ID 1)

Router Link States (Area 0)

Link ID	ADV Router	Age	Seq#	Checksum
Link count				
30.10.2.1	30.10.2.1	216	0x80000003	0x005338 2
30.10.2.2	30.10.2.2	164	0x80000003	0x00c9be 2

Net Link States (Area 0)

Link ID	ADV Router	Age	Seq#	Checksum
30.10.2.1	30.10.2.1	216	0x80000001	0x0018b3

Router#sh ip ospf int Gig 0/0

Router#sh ip ospf int Gig 0/0

GigabitEthernet0/0 is up, line protocol is up
Internet address is 10.10.1.2/8, Area 0
Process ID 1, Router ID 30.10.2.1, Network Type BROADCAST,
Cost: 1
Transmit Delay is 1 sec, State DR, Priority 1
Designated Router (ID) 30.10.2.1, Interface address 10.10.1.2
No backup designated router on this network
Timer intervals configured, Hello 10, Dead 40, Wait 40,
Retransmit 5
Hello due in 00:00:02
Index 1/1, flood queue length 0
Next 0x0(0)/0x0(0)
Last flood scan length is 1, maximum is 1
Last flood scan time is 0 msec, maximum is 0 msec
Neighbor Count is 0, Adjacent neighbor count is 0
Suppress hello for 0 neighbor(s)

To change the Hello and Dead Interval Of Interface Gig 0/0 type the following commands:-

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int Gig 0/0
Router(config-if)#ip ospf hello-interval 20
Router(config-if)#ip ospf dead-interval 30
Router(config-if)#exit
Router(config)#exit
Router#
```

Now to check weather the interval of Hello and Dead changed type:

Router#sh ip ospf int Gig 0/0

```
Router#sh ip ospf int Gig 0/0

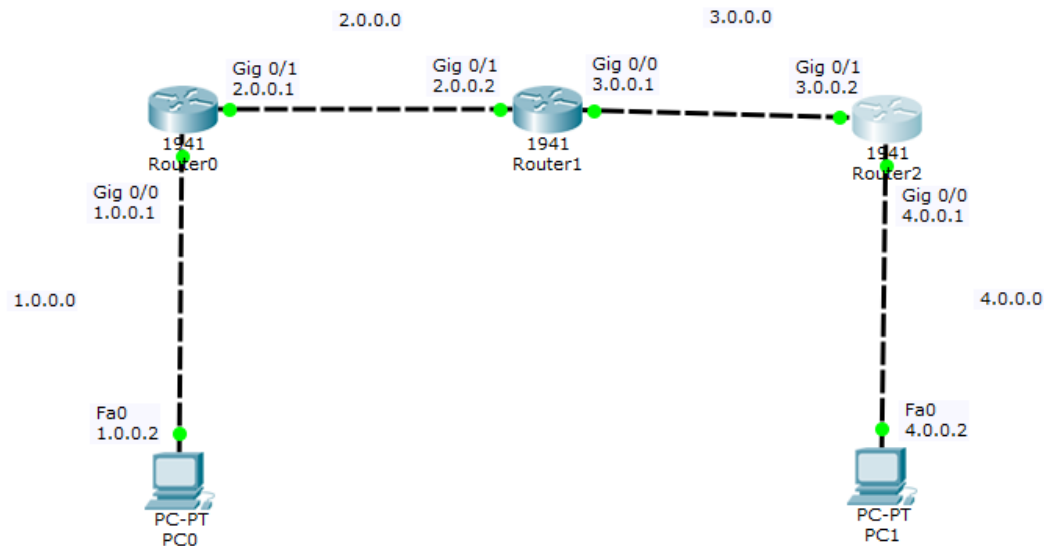
GigabitEthernet0/0 is up, line protocol is up
  Internet address is 10.10.1.2/8, Area 0
  Process ID 1, Router ID 30.10.2.1, Network Type BROADCAST,
  Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 30.10.2.1, Interface address 10.10.1.2
  No backup designated router on this network
  Timer intervals configured, Hello 20, Dead 30, Wait 30,
  Retransmit 5
    Hello due in 00:00:15
  Index 1/1, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 0, Adjacent neighbor count is 0
  Suppress hello for 0 neighbor(s)
_
```

Perform the same for Interface Gig 0/1 to change Hello and Dead Interval.

Practical 06(B)

Configuring Multiple Area OSPF

Aim: Configuring Multiple Area OSPF.



Assigning IP Address to PC0:

Open>>PC0>>Desktop>>IP Configuration>>IP Address>>1.0.0.2>>Default Gateway>>1.0.0.1

The screenshot shows the 'IP Configuration' window for PC0. The 'Static' radio button is selected. The 'IP Address' field is set to 1.0.0.2, the 'Subnet Mask' field is set to 255.0.0.0, and the 'Default Gateway' field is set to 1.0.0.1. The 'DNS Server' field is empty.

Assigning IP Address to PC1:

Open>>PC1>>Desktop>>IP Configuration>>IP Address>>4.0.0.2>>Default Gateway>>4.0.0.1

The screenshot shows the 'IP Configuration' window for PC1. The 'Static' radio button is selected. The 'IP Address' field is set to 4.0.0.2, the 'Subnet Mask' field is set to 255.0.0.0, and the 'Default Gateway' field is set to 4.0.0.1. The 'DNS Server' field is empty.

Assigning IP address to Router0:

Open>>Router0>>Config>>GigabitEthernet0/0>>IP Address>>1.0.0.1>>Subnet Mask>>255.0.0.0>>Port>>On

The screenshot shows the configuration window for the GigabitEthernet0/0 interface on Router0. The left sidebar has tabs for Physical, Config, CLI, and Attributes. The Config tab is active, showing a tree view with GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, INTERFACE, GigabitEthernet0/0, and GigabitEthernet0/1. The main area is titled 'GigabitEthernet0/0' and contains the following settings:

- Port Status: ☒ On
- Bandwidth: ☒ 1000 Mbps, ☐ 100 Mbps, ☐ 10 Mbps, ☒ Auto
- Duplex: ☒ Half Duplex, ☐ Full Duplex, ☒ Auto
- MAC Address: 0090.2B3B.1901
- IP Configuration:
 - IP Address: 1.0.0.1
 - Subnet Mask: 255.0.0.0
- Tx Ring Limit: 10

Open>> Router0>>Config>>GigabitEthernet0/1>>IP Address>>2.0.0.1>>Subnet Mask>>255.0.0.0>>Port >>On

The screenshot shows the configuration window for the GigabitEthernet0/1 interface on Router0. The left sidebar has tabs for Physical, Config, CLI, and Attributes. The Config tab is active, showing a tree view with GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, INTERFACE, GigabitEthernet0/0, and GigabitEthernet0/1. The main area is titled 'GigabitEthernet0/1' and contains the following settings:

- Port Status: ☒ On
- Bandwidth: ☒ 1000 Mbps, ☐ 100 Mbps, ☐ 10 Mbps, ☒ Auto
- Duplex: ☒ Half Duplex, ☐ Full Duplex, ☒ Auto
- MAC Address: 0090.2B3B.1902
- IP Configuration:
 - IP Address: 2.0.0.1
 - Subnet Mask: 255.0.0.0
- Tx Ring Limit: 10

Assigning IP address to Router1:

Open>>Router1>>Config>>GigabitEthernet0/0>>IP Address>>3.0.0.1>>Subnet Mask>>255.0.0.0>>Port>>On

The screenshot shows the configuration window for the GigabitEthernet0/0 interface on Router1. The left sidebar has tabs for Physical, Config, CLI, and Attributes. The Config tab is active, showing a tree view with GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, INTERFACE, GigabitEthernet0/0, and GigabitEthernet0/1. The main area is titled 'GigabitEthernet0/0' and contains the following settings:

- Port Status: ☒ On
- Bandwidth: ☒ 1000 Mbps, ☐ 100 Mbps, ☐ 10 Mbps, ☒ Auto
- Duplex: ☒ Half Duplex, ☐ Full Duplex, ☒ Auto
- MAC Address: 00E0.B0B2.0001
- IP Configuration:
 - IP Address: 3.0.0.1
 - Subnet Mask: 255.0.0.0
- Tx Ring Limit: 10

Open>> Router1>>Config>>GigabitEthernet0/1>>IP Address>>2.0.0.2>>Subnet Mask>>255.0.0.0>>Port>>On

The screenshot shows a network configuration window with tabs for Physical, Config, CLI, and Attributes. The Config tab is active, showing a left sidebar with a tree view containing GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, INTERFACE, GigabitEthernet0/0, and GigabitEthernet0/1. The main area is titled 'GigabitEthernet0/1' and contains the following settings: Port Status (checked On), Bandwidth (1000 Mbps selected, 100 Mbps and 10 Mbps unselected, Auto checked), Duplex (Half Duplex unselected, Full Duplex selected, Auto checked), MAC Address (00E0.B0B2.0002), IP Configuration (IP Address 2.0.0.2, Subnet Mask 255.0.0.0), and Tx Ring Limit (10).

Assigning IP address to Router2:

Open>> Router2>>Config>>GigabitEthernet0/0>>IP Address>>4.0.0.1>>Subnet Mask>>255.0.0.0>>Port>>On

The screenshot shows a network configuration window with tabs for Physical, Config, CLI, and Attributes. The Config tab is active, showing a left sidebar with a tree view containing GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, INTERFACE, GigabitEthernet0/0, and GigabitEthernet0/1. The main area is titled 'GigabitEthernet0/0' and contains the following settings: Port Status (checked On), Bandwidth (1000 Mbps selected, 100 Mbps and 10 Mbps unselected, Auto checked), Duplex (Half Duplex selected, Full Duplex unselected, Auto checked), MAC Address (0004.9A7B.0701), IP Configuration (IP Address 4.0.0.1, Subnet Mask 255.0.0.0), and Tx Ring Limit (10).

Open>> Router2>>Config>>GigabitEthernet0/1>>IP Address>>3.0.0.2>>Subnet Mask>>255.0.0.0>>Port>>On

The screenshot shows a network configuration window with tabs for Physical, Config, CLI, and Attributes. The Config tab is active, showing a left sidebar with a tree view containing GLOBAL, Settings, Algorithm Settings, ROUTING, Static, RIP, SWITCHING, VLAN Database, INTERFACE, GigabitEthernet0/0, and GigabitEthernet0/1. The main area is titled 'GigabitEthernet0/1' and contains the following settings: Port Status (checked On), Bandwidth (1000 Mbps selected, 100 Mbps and 10 Mbps unselected, Auto checked), Duplex (Half Duplex unselected, Full Duplex selected, Auto checked), MAC Address (0004.9A7B.0702), IP Configuration (IP Address 3.0.0.2, Subnet Mask 255.0.0.0), and Tx Ring Limit (10).

Configuring OSPF on Router 0 , Router 1 & Router 2:-

Router 0 CLI::

```
Router>en
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 1.0.0.0 255.0.0.0 area 0
Router(config-router)#network 2.0.0.0 255.0.0.0 area 0
Router(config-router)#exit
Router(config)#exit
Router#
```

Router 1 CLI::

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 2.0.0.0 255.0.0.0 area 0
Router(config-router)#network 3.0.0.0 255.0.0.0 area 1
Router(config-router)#exit
Router(config)#exit
Router#
```

Router 2 CLI::

```
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#router ospf 1
Router(config-router)#network 3.0.0.0 255.0.0.0 area 1
Router(config-router)#network 4.0.0.0 255.0.0.0 area 1
Router(config-router)#exit
Router(config)#exit
Router#
```

OUTPUT: For router R1:

Router#sh ip ospf

```
Router#sh ip ospf
Routing Process "ospf 1" with ID 3.0.0.1
Supports only single TOS(TOS0) routes
Supports opaque LSA
It is an area border router
SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs
Number of external LSA 0. Checksum Sum 0x000000
Number of opaque AS LSA 0. Checksum Sum 0x000000
Number of DCbitless external and opaque AS LSA 0
Number of DoNotAge external and opaque AS LSA 0
Number of areas in this router is 2. 2 normal 0 stub 0 nssa
External flood list length 0
Area BACKBONE(0)
Number of interfaces in this area is 1
Area has no authentication
SPF algorithm executed 5 times
Area ranges are
Number of LSA 5. Checksum Sum 0x02aaa3
Number of opaque link LSA 0. Checksum Sum 0x000000
Number of DCbitless LSA 0
Number of indication LSA 0
Number of DoNotAge LSA 0
--More--
```


Router#sh ip ospf neighbor

```
Router#sh ip ospf neighbor
```

Neighbor ID	Pri	State	Dead Time	Address
Interface				
2.0.0.1	1	FULL/DR	00:00:34	2.0.0.1
GigabitEthernet0/1				
4.0.0.1	1	FULL/BDR	00:00:31	3.0.0.2
GigabitEthernet0/0				
-				

Router#sh ip ospf database

```
Router#sh ip ospf database
      OSPF Router with ID (3.0.0.1) (Process ID 1)

      Router Link States (Area 0)

Link ID      ADV Router    Age      Seq#          Checksum Link
count
2.0.0.1      2.0.0.1        398      0x80000003    0x00b87c 2
3.0.0.1      3.0.0.1        364      0x80000003    0x00e260 1

      Net Link States (Area 0)

Link ID      ADV Router    Age      Seq#          Checksum
2.0.0.1      2.0.0.1        398      0x80000001    0x00bead

      Summary Net Link States (Area 0)

Link ID      ADV Router    Age      Seq#          Checksum
3.0.0.0      3.0.0.1        359      0x80000001    0x004b0c
4.0.0.0      3.0.0.1        229      0x80000002    0x00460e

      Router Link States (Area 1)

Link ID      ADV Router    Age      Seq#          Checksum Link
count
3.0.0.1      3.0.0.1        270      0x80000002    0x00e85a 1
4.0.0.1      4.0.0.1        234      0x80000003    0x00b575 2

      Net Link States (Area 1)

Link ID      ADV Router    Age      Seq#          Checksum
3.0.0.1      3.0.0.1        270      0x80000001    0x004992

      Summary Net Link States (Area 1)

Link ID      ADV Router    Age      Seq#          Checksum
2.0.0.0      3.0.0.1        359      0x80000001    0x0058ff
--More-- |
```

Router#sh ip ospf neighbor detail

```
Router#sh ip ospf neighbor detail
Neighbor 2.0.0.1, interface address 2.0.0.1
  In the area 0 via interface GigabitEthernet0/1
  Neighbor priority is 1, State is FULL, 6 state changes
  DR is 2.0.0.1 BDR is 2.0.0.2
  Options is 0x00
  Dead timer due in 00:00:30
  Neighbor is up for 00:09:09
  Index 1/1, retransmission queue length 0, number of retransmission
0
  First 0x0(0)/0x0(0) Next 0x0(0)/0x0(0)
  Last retransmission scan length is 0, maximum is 0
  Last retransmission scan time is 0 msec, maximum is 0 msec
Neighbor 4.0.0.1, interface address 3.0.0.2
  In the area 1 via interface GigabitEthernet0/0
  Neighbor priority is 1, State is FULL, 5 state changes
  DR is 3.0.0.1 BDR is 3.0.0.2
  Options is 0x00
  Dead timer due in 00:00:38
  Neighbor is up for 00:07:02
  Index 2/2, retransmission queue length 0, number of retransmission
0
  First 0x0(0)/0x0(0) Next 0x0(0)/0x0(0)
  Last retransmission scan length is 0, maximum is 0
  Last retransmission scan time is 0 msec, maximum is 0 msec
```

Router#sh ip ospf int Gig 0/0

```
Router#sh ip ospf int Gig 0/0

GigabitEthernet0/0 is up, line protocol is up
  Internet address is 3.0.0.1/8, Area 1
  Process ID 1, Router ID 3.0.0.1, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 3.0.0.1, Interface address 3.0.0.1
  Backup Designated Router (ID) 4.0.0.1, Interface address 3.0.0.2
  Timer intervals configured, Hello 10, Dead 40, Wait 40, Retransmit
    Hello due in 00:00:01
  Index 2/2, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 1, Adjacent neighbor count is 1
    Adjacent with neighbor 4.0.0.1 (Backup Designated Router)
  Suppress hello for 0 neighbor(s)
```

To change the Hello and Dead Interval Of Interface Gig 0/0 type the following commands:-

```
Router#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int Gig 0/0
Router(config-if)#ip ospf hello-interval 30
Router(config-if)#ip ospf dead-interval 20
Router(config-if)#exit
Router(config)#exit
Router#
```

Now to check weather the interval of Hello and Dead changed type:

Router#sh ip ospf int Gig 0/0

```
Router#sh ip ospf int Gig 0/0

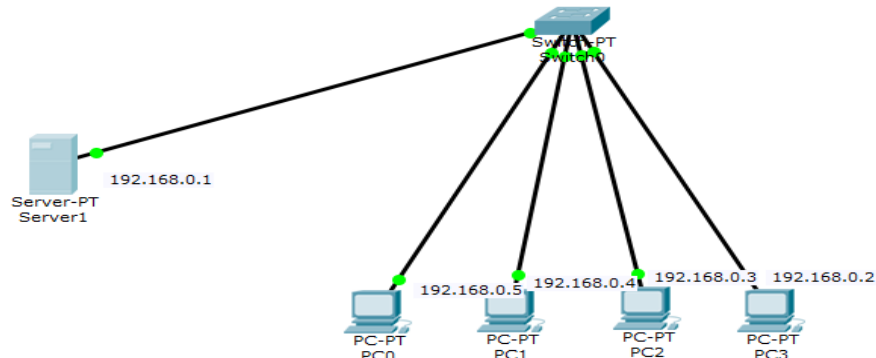
GigabitEthernet0/0 is up, line protocol is up
  Internet address is 3.0.0.1/8, Area 1
  Process ID 1, Router ID 3.0.0.1, Network Type BROADCAST, Cost: 1
  Transmit Delay is 1 sec, State DR, Priority 1
  Designated Router (ID) 3.0.0.1, Interface address 3.0.0.1
  No backup designated router on this network
  Timer intervals configured, Hello 30, Dead 20, Wait 20, Retransmit
    Hello due in 00:00:23
  Index 2/2, flood queue length 0
  Next 0x0(0)/0x0(0)
  Last flood scan length is 1, maximum is 1
  Last flood scan time is 0 msec, maximum is 0 msec
  Neighbor Count is 0, Adjacent neighbor count is 0
  Suppress hello for 0 neighbor(s)
```

Perform the same for Interface Gig 0/1 to change Hello and Dead Interval.

Practical 07

Configuring DNS

Aim: Configuring DNS Server and Client.



Assigning IP Address To Server-PT Server1:

Open>>Server-PT Server1>>Desktop>>IP Configure>>IP Address>>192.168.0.1>>Subnet Mask>>255.255.255.0>>DNS Server>>192.168.0.1

The screenshot shows the 'IP Configuration' window for the 'FastEthernet0' interface. The 'Static' radio button is selected. The fields are filled with: IP Address: 192.168.0.1, Subnet Mask: 255.255.255.0, and DNS Server: 192.168.0.1. The 'Default Gateway' field is empty.

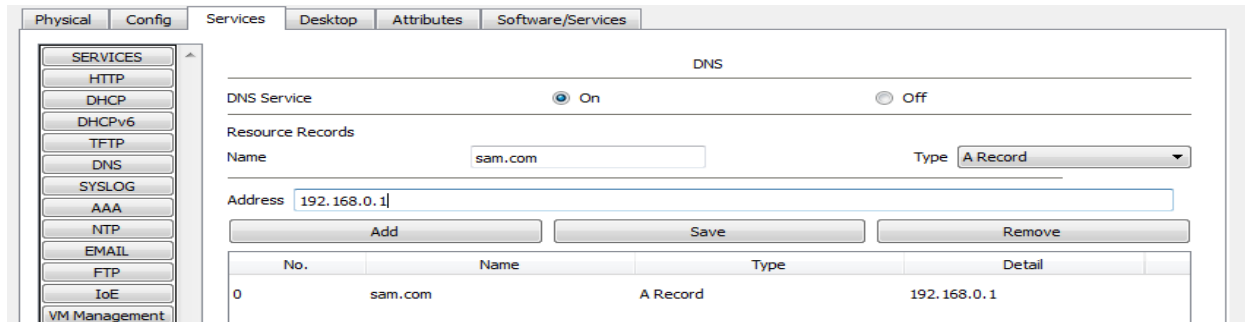
Assigning IP Address To Server-PT Server1 Through DHCP :

Open>>Server-PT Server1>>Services>>DHCP >>Start IP Address>>192.168.0.2 >>Subnet Mask>>255.255.255.0>>DHCP Service>>ON>>Save

The screenshot shows the 'DHCP' configuration window for the 'FastEthernet0' interface. The 'Service' is set to 'On'. The 'Pool Name' is 'serverPool'. The 'Default Gateway' is '0.0.0.0' and the 'DNS Server' is '0.0.0.0'. The 'Start IP Address' is configured as 192.168.0.2 (split into 192, 168, 0, 2) and the 'Subnet Mask' is 255.255.255.0 (split into 255, 255, 255, 0). The 'Maximum number of Users' is set to 254. The 'TFTP Server' is '0.0.0.0'. There are 'Add', 'Save', and 'Remove' buttons at the bottom.

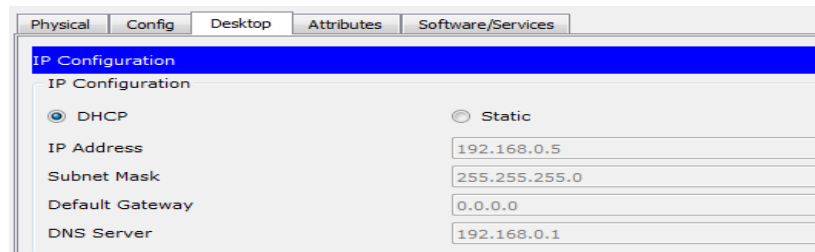
Assigning DNS NAME AND ADDRESS To Server-PT Server1 Through DNS:

Open>>ServerPTServer1>>Services>>DNS>>NAME>sam.com>>Address>>192.168.0.1>>
DNS Service>>ON>>Save



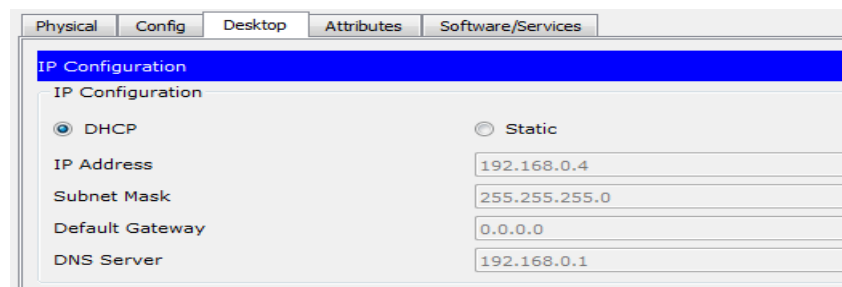
Assigning IP Address To PC0:

Open>>PC-PT PC0>> Desktop>>IP Configuration>>IP Address>>DHCP>>192.168.0.5



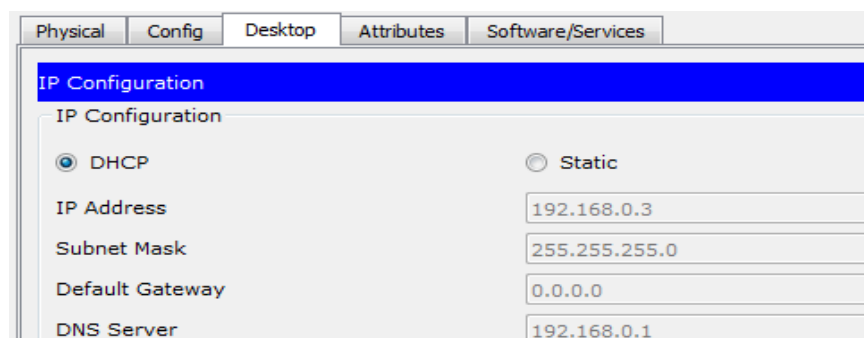
Assigning IP Address To PC1:

Open>>PC-PT PC0>> Desktop>>IP Configuration>>IP Address>>DHCP>>192.168.0.4



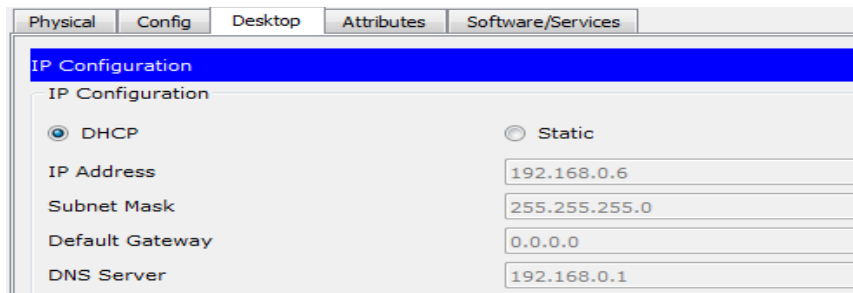
Assigning IP Address To PC2:

Open>>PC-PT PC0>> Desktop>>IP Configuration>>IP Address>>DHCP>>192.168.0.3

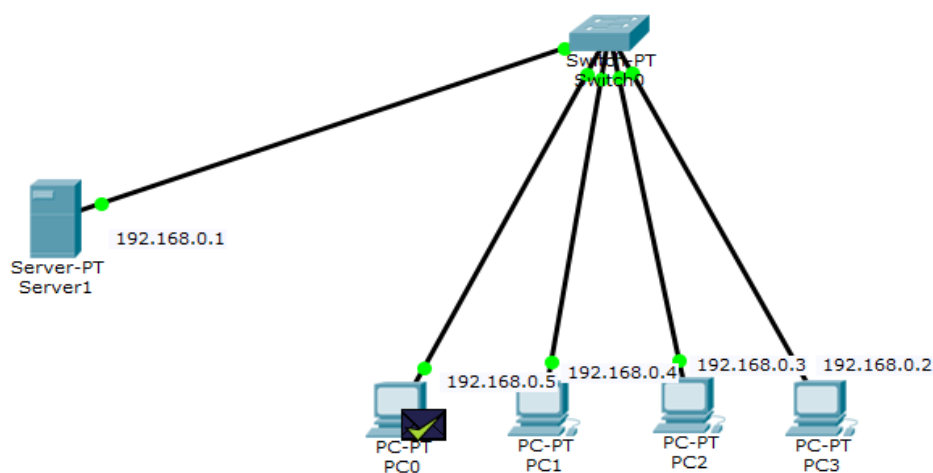


Assigning IP Address To PC4:

Open>>PC-PT PC0>> Desktop>>IP Configuration>>IP Address>>DHCP>>192.168.0.2



Sending message:



Successful:

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Nur
	Successful	PC0	PC2	ICMP		0.000	N	0

Check connection using ping command:

Open>>PC0>>Desktop>>Command Prompt>>ping sam.com >>Enter

```
C:\>ping sam.com

Pinging 192.168.0.1 with 32 bytes of data:

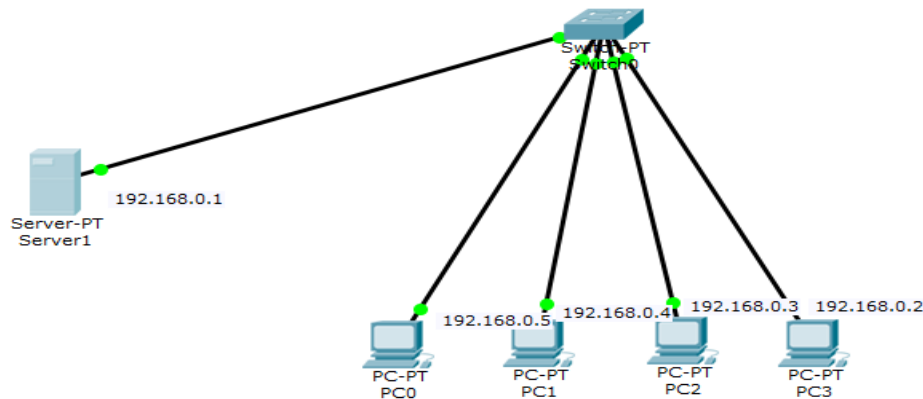
Reply from 192.168.0.1: bytes=32 time=14ms TTL=128
Reply from 192.168.0.1: bytes=32 time<1ms TTL=128
Reply from 192.168.0.1: bytes=32 time<1ms TTL=128
Reply from 192.168.0.1: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.0.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 14ms, Average = 3ms
```

Practical 08

Configuring DHCP

Aim: Configuring DHCP Server and Client.



Assigning IP Address To Server-PT Server1:

Open>>Server-PT Server1>>Desktop>>IP Configure>>IP Address>>192.168.0.1>>Subnet Mask>>255.255.255.0

Physical Config Services Desktop Attributes Software/Services

IP Configuration

Interface: FastEthernet0

IP Configuration

☐ DHCP ☒ Static

IP Address: 192.168.0.1

Subnet Mask: 255.255.255.0

Assigning IP Address To Server-PT Server1 Through DHCP :

Open>>Server-PT Server0>>Services>>DHCP >>Start IP Address>>192.168.0.2 >>Subnet Mask>>255.255.255.0>>DHCP Service>>ON>>Save

Physical Config Services Desktop Attributes Software/Services

SERVICES

HTTP DHCP DHCPv6 TFTP DNS SYSLOG AAA NTP EMAIL FTP IoE VM Management

DHCP

Interface: FastEthernet0 Service: ☒ On ☐ Off

Pool Name: serverPool

Default Gateway: 0.0.0.0

DNS Server: 0.0.0.0

Start IP Address : 192 168 0 2

Subnet Mask: 255 255 255 0

Maximum number of Users : 254

TFTP Server: 0.0.0.0

Add Save Remove

Assigning IP Address To PC0:

Open>>PC-PT PC0>> Desktop>>IP Configuration>>IP Address>>DHCP>>192.168.0.5

The screenshot shows the 'IP Configuration' window for PC0. The 'Desktop' tab is active. Under 'IP Configuration', the 'DHCP' radio button is selected. The 'IP Address' field is set to 192.168.0.5, 'Subnet Mask' is 255.255.255.0, 'Default Gateway' is 0.0.0.0, and 'DNS Server' is 0.0.0.0.

Field	Value
IP Address	192.168.0.5
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
DNS Server	0.0.0.0

Assigning IP Address To PC1:

Open>>PC-PT PC0>> Desktop>>IP Configuration>>IP Address>>DHCP>>192.168.0.4

The screenshot shows the 'IP Configuration' window for PC1. The 'Desktop' tab is active. Under 'IP Configuration', the 'DHCP' radio button is selected. The 'IP Address' field is set to 192.168.0.4, 'Subnet Mask' is 255.255.255.0, 'Default Gateway' is 0.0.0.0, and 'DNS Server' is 0.0.0.0.

Field	Value
IP Address	192.168.0.4
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
DNS Server	0.0.0.0

Assigning IP Address To PC2:

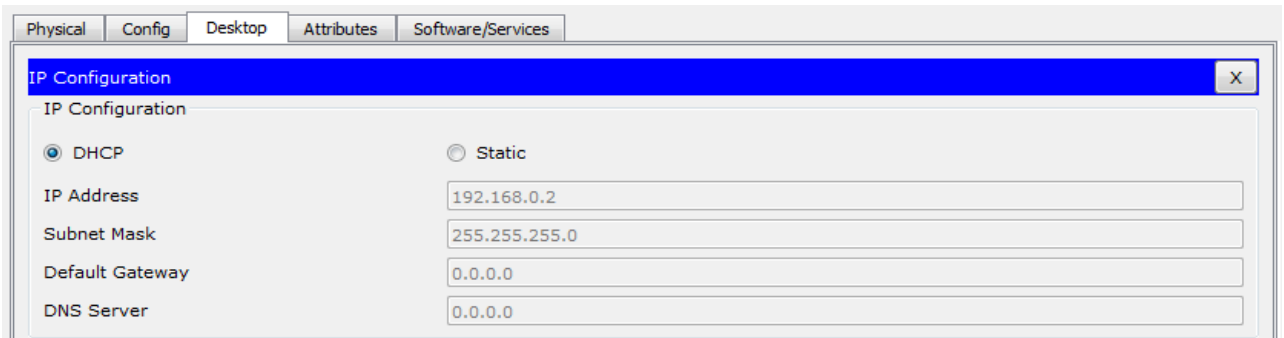
Open>>PC-PT PC0>> Desktop>>IP Configuration>>IP Address>>DHCP>>192.168.0.3

The screenshot shows the 'IP Configuration' window for PC2. The 'Desktop' tab is active. Under 'IP Configuration', the 'DHCP' radio button is selected. The 'IP Address' field is set to 192.168.0.3, 'Subnet Mask' is 255.255.255.0, 'Default Gateway' is 0.0.0.0, and 'DNS Server' is 0.0.0.0.

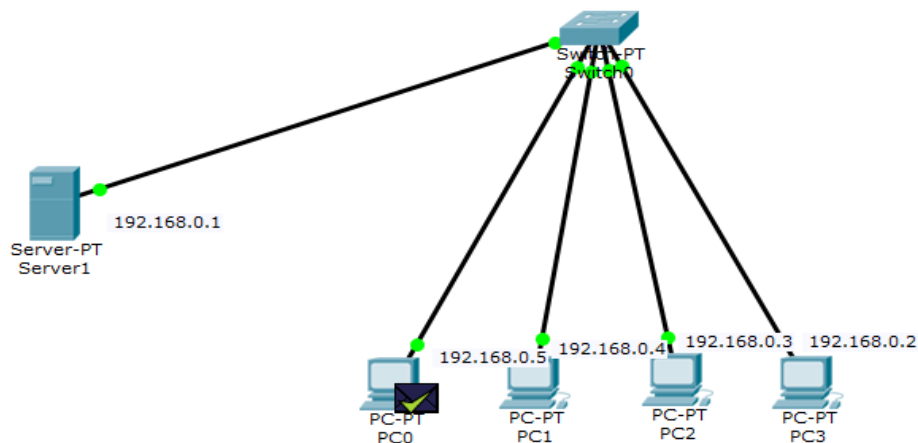
Field	Value
IP Address	192.168.0.3
Subnet Mask	255.255.255.0
Default Gateway	0.0.0.0
DNS Server	0.0.0.0

Assigning IP Address To PC4:

Open>>PC-PT PC0>> Desktop>>IP Configuration>>IP Address>>DHCP>>192.168.0.2



Sending message:



Successful:

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Nur
	Successful	PC0	PC2	ICMP		0.000	N	0

Check connection using ping command:

Open>>PC0>>Desktop>>Command Prompt>>ping 192.168.0.3>>Enter

```
Packet Tracer PC Command Line 1.0
C:\>ping 192.168.0.3

Pinging 192.168.0.3 with 32 bytes of data:

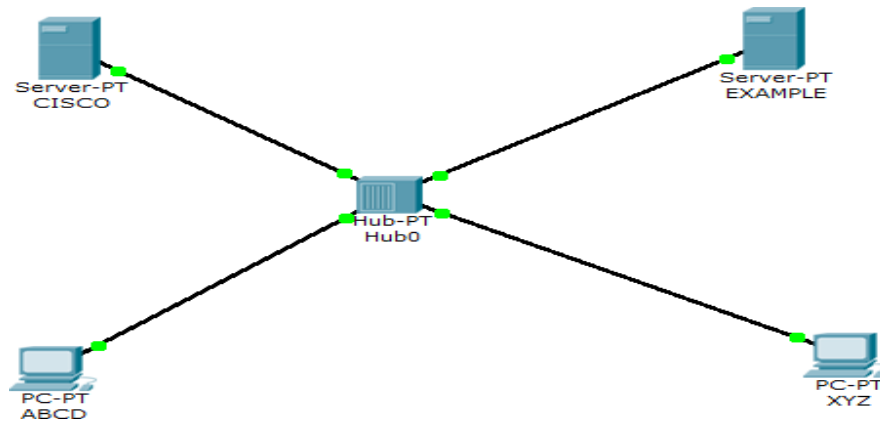
Reply from 192.168.0.3: bytes=32 time=4ms TTL=128
Reply from 192.168.0.3: bytes=32 time=4ms TTL=128
Reply from 192.168.0.3: bytes=32 time=4ms TTL=128
Reply from 192.168.0.3: bytes=32 time=4ms TTL=128

Ping statistics for 192.168.0.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 4ms, Average = 4ms
```


Practical 09

Configuring SMTP, POP3 & IMAP

Aim: Configuring SMTP ,POP3 and IMAP



Step 1: Configuring the CISCO server

The image shows two screenshots from the Cisco Packet Tracer interface.

The top screenshot is the "IP Configuration" window for the "FastEthernet0" interface. It shows the "Static" IP configuration option selected. The IP Address is set to 10.0.0.1, and the Subnet Mask is set to 255.0.0.0. The Default Gateway and DNS Server fields are empty.

The bottom screenshot is the "Services" configuration window for the "EMAIL" service. It shows the "SMTP Service" and "POP3 Service" both set to "ON". The Domain Name is set to "cisco.com". Under "User Setup", a user named "abcd" is listed with a password of "abcd".

Physical Config **Services** Desktop Attributes Custom Interface

SERVICES

HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoE
VM Management

DNS

DNS Service ☒ On ☐ Off

Resource Records

Name Type **A Record**

Address

Add Save Remove

Id	Name	Type	Detail
0	cisco.com	A Record	10.0.0.1
1	example.com	A Record	10.0.0.2

Step 2: Configuring the EXAMPLE server

IP Configuration X

Interface **FastEthernet0**

IP Configuration

☐ DHCP ☒ Static

IP Address

Subnet Mask

Default Gateway

DNS Server

Physical Config **Services** Desktop Attributes Custom Interface

SERVICES

HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoE
VM Management

EMAIL

SMTP Service ☒ ON ☐ OFF

POP3 Service ☒ ON ☐ OFF

Domain Name: Set

User Setup

User Password

+
-

Physical Config **Services** Desktop Attributes Custom Interface

SERVICES ^

HTTP
DHCP
DHCPv6
TFTP
DNS
SYSLOG
AAA
NTP
EMAIL
FTP
IoE
VM Management

DNS

DNS Service ☒ On ☐ Off

Resource Records

Name Type **A Record** ▼

Address

Add **Save** **Remove**

Id	Name	Type	Detail
0	cisco.com	A Record	10.0.0.1
1	example.com	A Record	10.0.0.2

Physical Config **Services** Desktop Attributes Custom Interface

GLOBAL ^

Settings
Algorithm Settings
INTERFACE
FastEthernet0

Global Settings

Display Name

Gateway/DNS IPv4

☐ DHCP
☒ Static

Gateway

DNS Server

Step 3: Configuring PC0(ABCD)

IP Configuration X

IP Configuration

☐ DHCP ☒ Static

IP Address

Subnet Mask

Default Gateway

DNS Server

Physical Config Desktop Attributes Custom Interface

Configure Mail

User Information

Your Name:

Email Address:

Server Information

Incoming Mail Server:

Outgoing Mail Server:

Logon Information

User Name:

Password:

Save Clear Reset

Step 3: Configuring PC1(XYZ)

Physical Config Desktop Attributes Custom Interface

IP Configuration

IP Configuration

☐ DHCP ☒ Static

IP Address:

Subnet Mask:

Default Gateway:

DNS Server:

Physical Config Desktop Attributes Custom Interface

Configure Mail

User Information

Your Name:

Email Address:

Server Information

Incoming Mail Server:

Outgoing Mail Server:

Logon Information

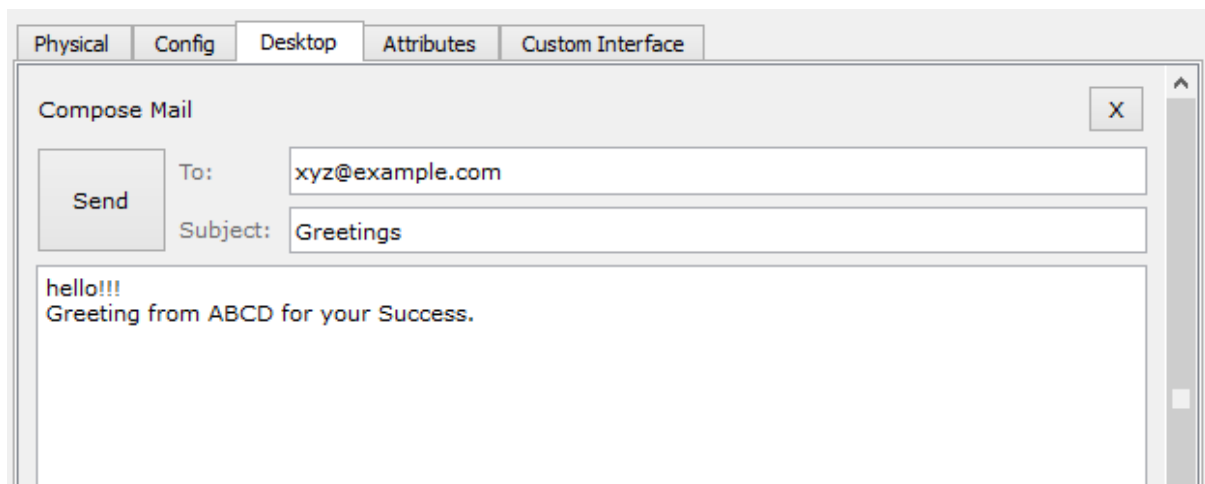
User Name:

Password:

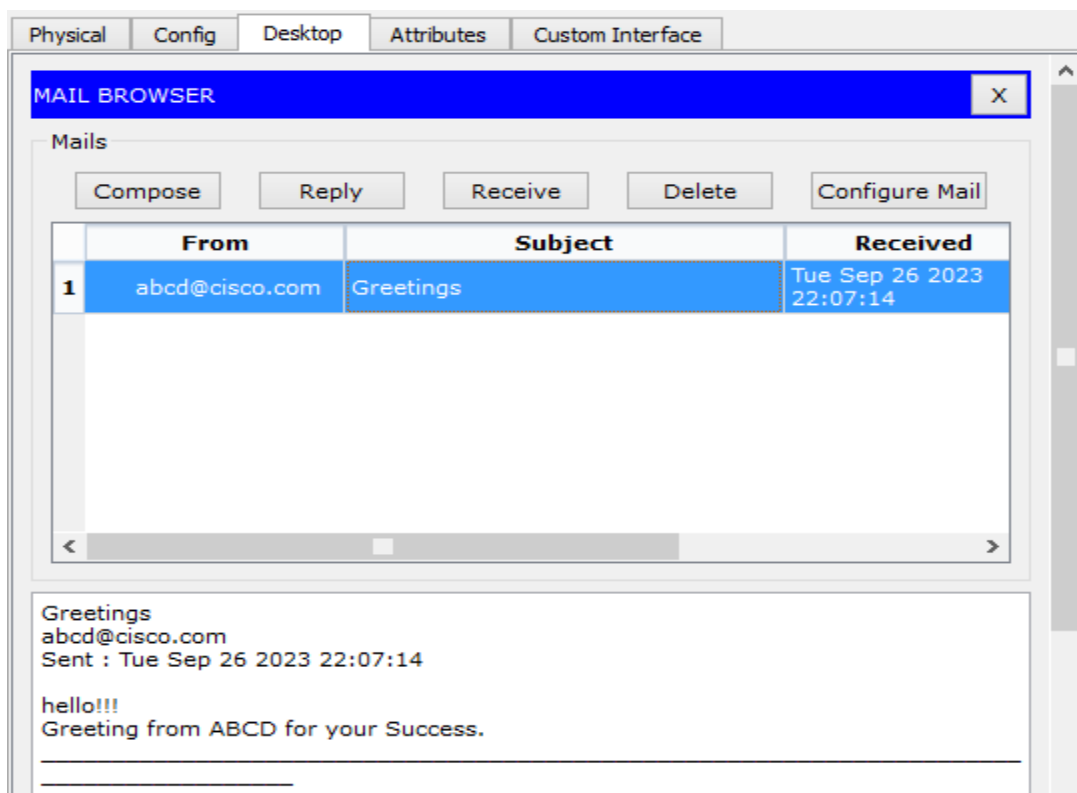
Save Clear Reset

Now we check the working of the mail servers by sending mail as follows:

On PC0(ABCD) Compose a mail and click on Send Button,



Now we check the receiver mail at the PC1(xyz) by clicking on Receive Button,



Hence we have successfully created a mail server and check the working of all the protocols concerned with email.