CLASS : SYCS | DATE :

Practical No. : 1 Topic : CN

Aim :- Using, linux - terminal or Windows - cmd, execute following networking commands and note the output : ping, traceroute, netstat, arp, ipconfig, Getmac, hostname, NSLookUp, pathping, SystemInfo

Theory :-

1) ping - ping is a computer network administration software utility used to test the reachability of a host on an Internet Protocol network. It is available for virtually all operating system that have networking capability, including most embedded network administration software.

2) traceroute - The traceroute command (tracert) is a utility designed for displaying the time it take for a packet of information to travel between a host system and the final destination system. This command returns a list of the hops that the data packets take along their path along their way to the destination.

3) netstat - The netstat provides statistics about all active connection so you that we can find out which computers or networks a PC is connected to some of the netstat command commonly used are

i) netstat -in command

This netstat function shows the state of all sockets

ii) netstat -a command

It shows the state of all sockets

iii) netstat -s

It shows statistics for each protocol.

iv) netstat -r

Another option relevant to performance is the display of the discovered Path Maximum Transmission Unit (PMTU)

4) arp - The ARP (Address Resolution Protocol) commands are used to view, display or modify the details / information in an ARP table / cache. Some of the comman arp commands are as follow

i) arp -a

It is used to display the ARP table for a particular IP address. It also shows all the entries of the ARP cache or table.

ii) arp -g

Same as the arp -a command.

iii) arp -d

It is used to delete an entry from the ARP table for a particular interface. To delete an entry, write arp -d command along with the IP address in a command prompt to be deleted.

iv) arp -s

This command is used to add the static entry in the ARP table, which resolves the InetAddr (IP Address) to the EtherAddress (physical address). To add a static entry in ARP table, we write arp -s command along with the IP address & MAC address of

the device in a command prompt.

5) ipconfig - ipconfig (Internet Protocol CONFIGURATION) is used to display & manage the IP address assigned to the machine. In windows, typing inconfig without any parameters display the computer's currently assigned IP, subnet mask and dfault gate way addresses.

6) getmac - Getmac is a windows command used to display the Media Access Control (MAC) addresses for each network adapter in the computer.

7) hostname - It is a label that is assigned to device connected to computer network & it used to identify the device.

8) NSlookUp - Using command we can find corresponding IP address or domain name system record. The user can also enter a command for it do reverse. DNS lookUp & find the host name for an IP addresses that is specified.

9) Pathping - This command sends multiple echo Request message to each routes between a source & destination, over a period of time & then computer result based on the packets returned from each routes. It can be used to find the routes or link having network problem.

10) SystemInfo - This command is used to display detailed configuration information about a computer & its operating system, including operating system configuration, security information, product ID and hardware properties.

Rajesh
27/11/25

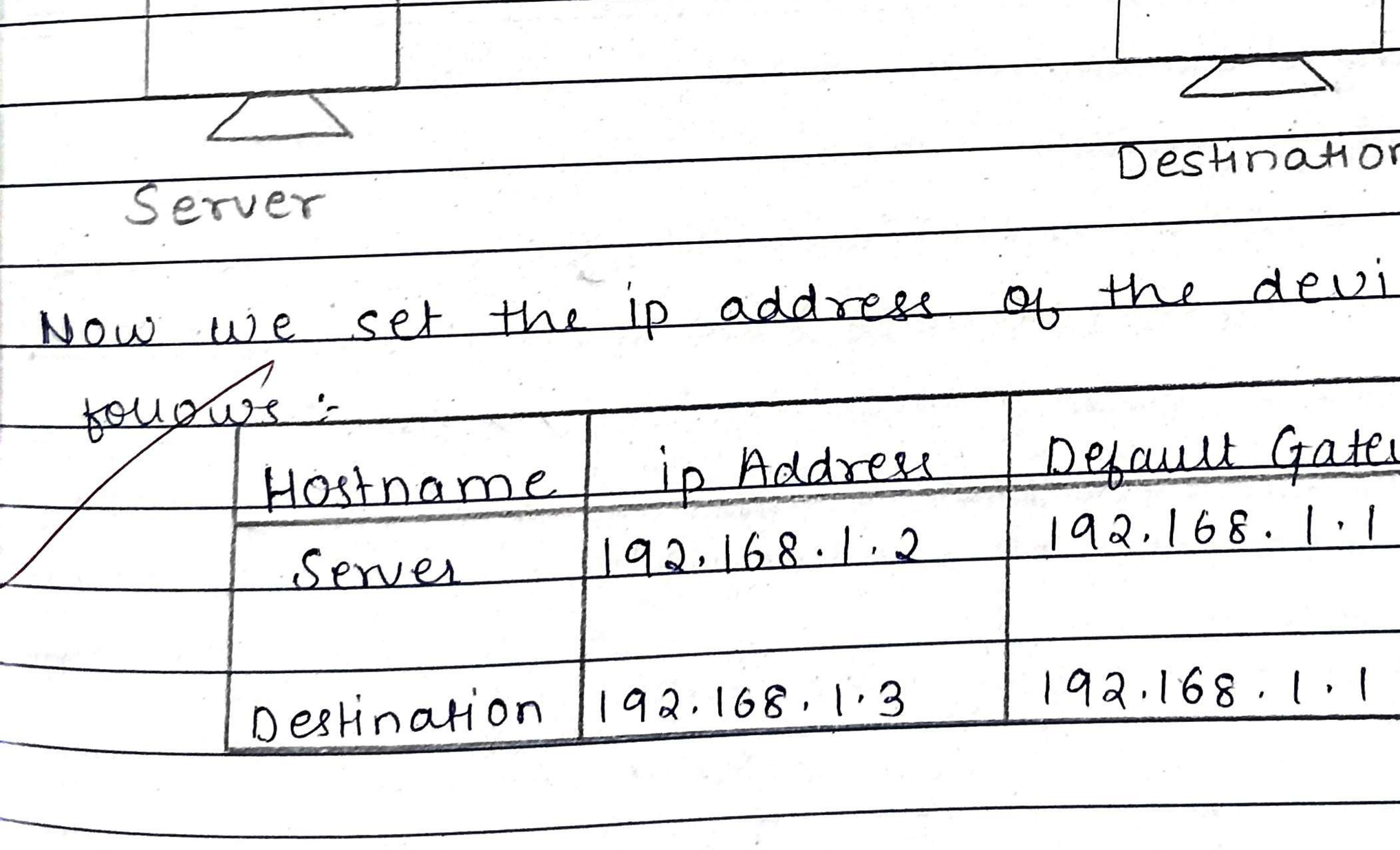
CLASS : SYCS | DATE :

Practical No. : 02 Topic : CN

Aim :- Using Packet Tracer, create a basic network of two computers using appropriate network wire through static IP address allocation & verify connectivity.

Theory :-

We use the following network to verify the connectivity using Cisco packet tracer



Now we set the ip address of the device as follows :-

Hostname	ip Address	Default Gateway
Server	192.168.1.2	192.168.1.1
Destination	192.168.1.3	192.168.1.1

In order to check the connectivity we send a ping command from server to destination as follows:

Server

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 192.168.1.3

Pinging 192.168.1.3 : bytes = 32 time = 7ms TTL = 128
Reply from 192.168.1.3: bytes = 32 time = 7ms TTL = 128
Reply from 192.168.1.3 : bytes = 32 time <1ms TTL = 128
Reply from 192.168.1.3 : bytes = 32 time < 1ms TTL = 128
Reply from 192.168.1.3 : bytes = 32 time < 1ms TTL = 128

Ping statistics for 192.168.1.3 :
    Packets : Sent = 4 , Received = 4 , Lost = 0 (0% Loss),
Approximate round trip times in multi-seconds:
    Minimum = 0ms , Maximum = 7ms , Average = 1ms
```

Server

Physical Config Desktop Programming Attributes

Interface: FastEthernet0

IP Configuration

○ DHCP ○ Static

IPv4 Address: 192.168.1.2

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.1.1

DNS Server: 0.0.0.0

IPv6 Configuration

○ Automatic ○ Static

IPV6 Address

Link local Address: Fe80::206:2AFF:FE01:EEDE

Default Gateway

DNS Server

Destination

Physical Config Desktop Programming Attributes

Interface: FastEthernet0

IP Configuration

○ DHCP ○ Static

IPv4 Address: 192.168.1.3

Subnet Mask: 255.255.255.0

Default Gateway: 192.168.1.1

DNS Server: 0.0.0.0

IPv6 Configuration

○ Automatic ○ Static

IPv6 Address

link local Address: Fe80::206:2AFF:Fe01:EED

Default Gateway

DNS Server

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CLASS : SYCS | DATE :

Practical No. : 03 Topic :

Aim :- Using Packet Tracer, create a basic network of One server and two computers using appropriate network wire. Use Dynamic IP address allocation and show connectivity.

Theory

for assigning ip addresses dynamically we use the DHCP protocol

Dynamic Host Configuration Protocol ~~(DP)~~ (DHCP) is a client / server protocol that automatically provides an Internet Protocol (IP) host with its IP address & other related configuration information such as the subnet mask and default gateway.

The DHCP server maintain a pool of IP addresses and leases an addresses to any DHCP - enabled client when its starts up on the network. Because the IP addresses are dynamic rather than static, addresses no longer in use are automatically returned to the pool for reallocation.

DHCP provides the following benefits :-

1) Reliable IP address configuration. DHCP minimizes configuration error caused by manual IP addresse configuration, such as typographical error, or address conflict caused by assignment of an IP addresse to more than one computer at same time.

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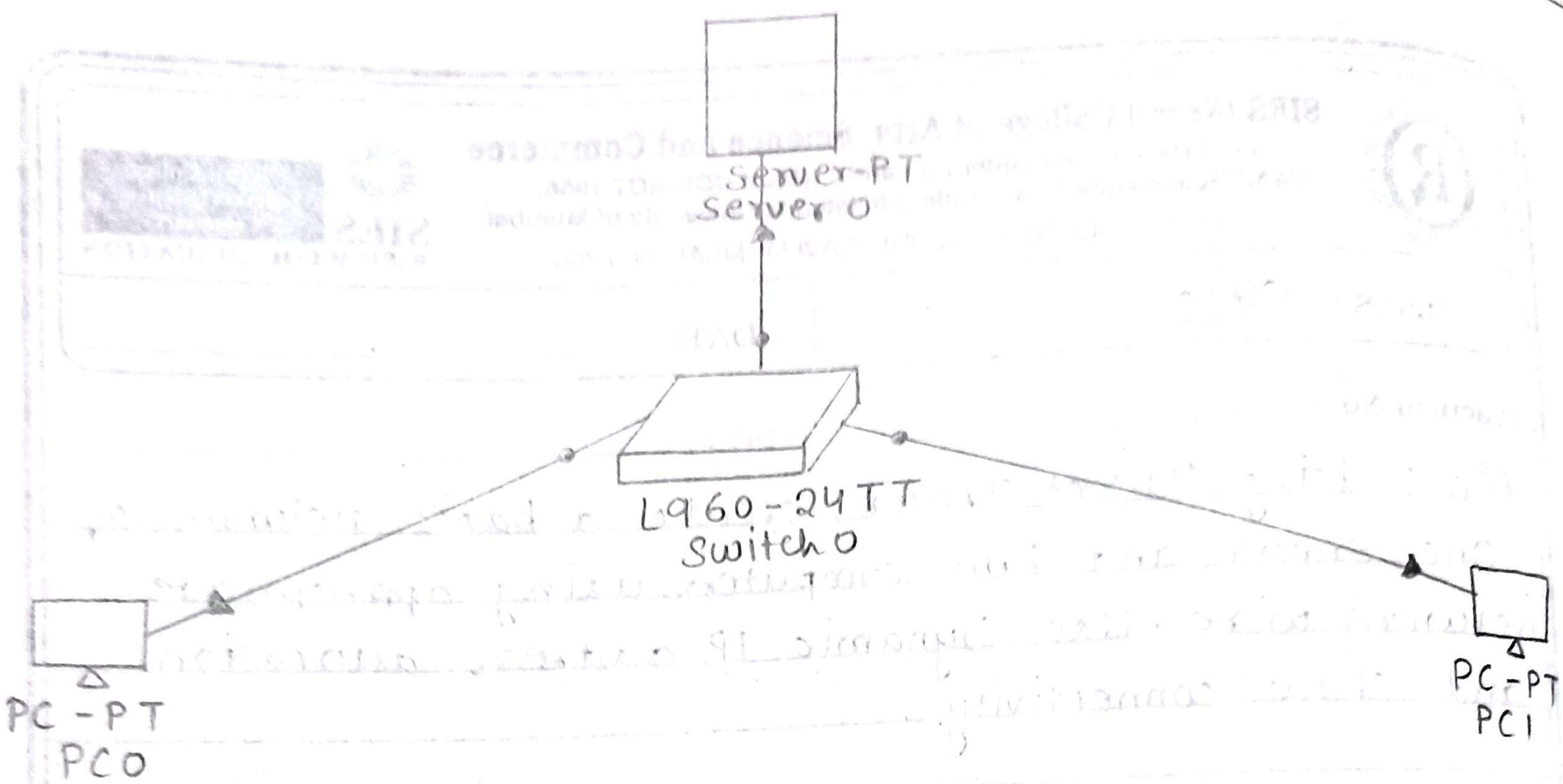

Configuring the Server

Server 0

Physical Config Services Desktop Programming

IP Configuration

IP Configuration

- ● DHCP
- ○ Static

IPv4 Address: 10.0.0.2

Subnet Mask: 255.0.0.0

Default Gateway: 10.0.0.1

DNS Server: 10.0.0.2

IPv6 Configuration

- ● Automatic
- ○ Static

IPV6 Address:

Link local Address: Fe80:201:96FF:FE30:3343

Default Gateway:

DNS Server:

2) Reduced network administration. DHCP include the following features to reduce network administration. DHCP runs at the application layer of Transmission Control Protocol / IP (TCP/IP) stack to dynamically assign IP addresses to DHCP clients and to allocate TCP/IP configuration information to DHCP clients.

Enabling & setting the DHCP service on server:

Server 0

Physical Config Services Desktop Programming Attributes

SERVICES

- HTTP
- DHCP
- DHCPv6
- TFTP
- DNS
- SYSLOG
- AAA
- NTP
- EMAIL
- FTP
- IOT
- VM Management
- Radius EAP

DHCP

Interface: FastEthernet | Service: ON / OFF

Pool Name: serverPool

Default Gateway: 10.0.0.1

DNS Server: 10.0.0.2

Start IP Address: 10 . 0 . 0 . 3

Subnet Mask: 225 . 0 . 0 . 0

Maximum Number of Users: 512

TFTP Server: 0.0.0.0

WLC Address: 0.0.0.0

Add | Save | Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User
serverPool	10.0.0.1	10.0.0.2	10.0.0.3	255.0.0.0	512

Checking the connectivity:

PC1

Physical Config Desktop Programming Attributes

Command Prompt

```
Cisco Packet Tracer PC Command Line 1.0
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 = 120
Reply from 10.0.0.3: bytes = 32 time <1ms TTL = 120
Reply from 10.0.0.3: bytes = 32 time <1ms TTL = 120
Reply from 10.0.0.3: bytes = 32 time <1ms TTL = 120

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

Verifying the Dynamic Addressing on both the PCs :

PC0

Physical Config Desktop Programming Attributes

Interface: FastEthernet0

IP Configuration

• DHCP o Static DHCP request successful.

IPv4 Address: 10.0.0.3

Subnet Mask: 255.0.0.0

Default Gateway: 10.0.0.1

DNS Server: 10.0.0.2

IPv6 Configuration

o Automatic • Static

IPv6 Address:

Link local Address: Fe80:260:5CFf:FE65:C024

Default Gateway:

DNS Server:

PC1

Physical Config Desktop Programming Attributes.

Interface: FastEthernet0

IP Configuration

o DHCP o Static DHCP request successful

IPv4 Address: 10.0.0.4

Subnet Mask: 255.0.0.0

Default Gateway: 10.0.0.1

DNS Server: 10.0.0.2

IPv6 Configuration

o Automatic o Static

IPv6 Address:

Linklocal Address: fe80:260:70ff:FE82:2EC7

Default Gateway:

DNS Server.

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CLASS : SYCS | DATE : 27/01/2023

Practical No. : 04 Topic : _____

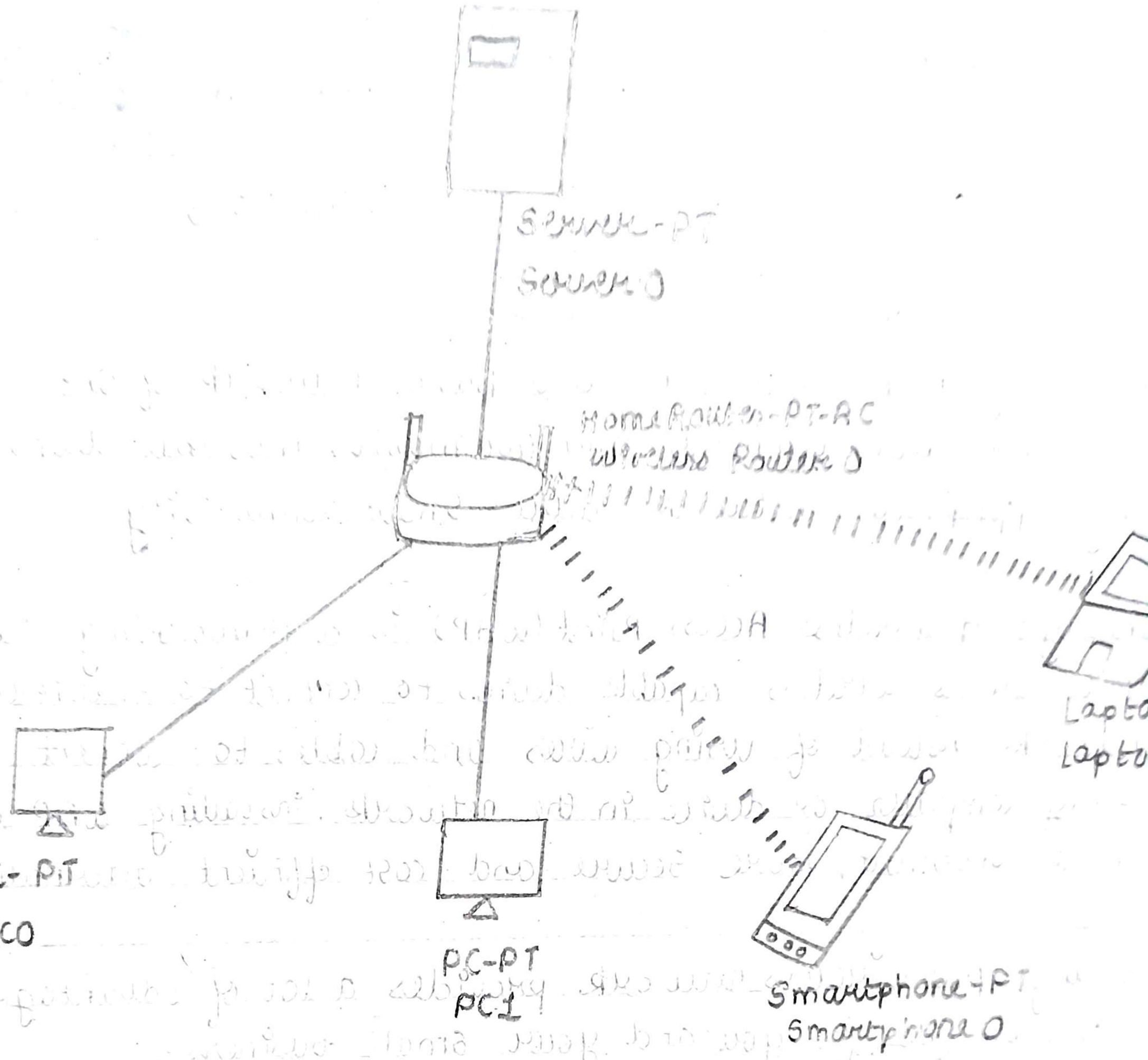
Aim:- Using Packet Tracer create a basic network of one Server and two computers and two mobile/ movable devices using appropriate network wire. Show connectivity

Theory: A Wireless Access Point (WAP) is a networking device that allows wireless capable devices to connect to a wierd network. Instead of using wires and cables to connect every computer or device in the network, installing WAP is more convenient, more secure and cost effient alternative.

Setting up a wireless network provides a lot of advantages and benefits for you and your small business.

1. It is easier to set up compared to setting up and wired network
2. It is more convenient to acces.
3. It is less complicated to add new users in the network
4. It gives user more flexibility to stay online even when moving from one area in the office to another.
5. Guest users can have internet acces by just using a password.
6. Wireless network production can be set up even if the network is visible to the public by configuring maximum wireless security.
7. Segementation of users such as guests and employees is possible by creating Virtual local Area Network (VLANS) to protect your network resources and assets.

Fore the present case we use the following topology



Configure the Server

Physical	Config	Services	Desktop	Programming	Attributes
IP configuration					
○ DHCP	● Static				
IPV4 Address	192.168.1.2				
Subnet Mask	255.255.255.0				
Default Gateway	192.168.1.1				
DNS Server	0.0.0.0				
IPV6 configuration					
○ Automatic	● Static				
IPV6 Address					
Link local Address	FE80::201:43FF:FECD:0046				
Default Gateway					
DNS Server					

There are different purposes of setting up a wireless network using a WAP
With a WAP the following can be done.

1. Create a wireless network within your existing wired network.
2. Extend the signal range and strength of your wireless network to provide complete wireless coverage and get rid of dead spots especially in larger office spaces or buildings.
3. Accomodate wireless devices within a wired network
4. Configure the settings of your wireless access point in one device.

Configure PC0

Physical Config Desktop Programming Attributes

Interface FastEthernet 0

IP configuration

○ DHCP	● Static
IPv4 Address	192.168.1.3
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1
DNS Server	0.0.0.0

IPv6 Configuration

○ Automatic	○ Static
IPV6 Address	
Link local address	FE80::202:17FF:FA85:7024
Default Gateway	
DNS Server	

Configure PC1

Physical Config Desktop Programming Attribute

Interface Wireless 0

○ DHCP	● Static
IPv4 Address	192.168.1.4
Subnet mask	255.255.255.0
Default gateway	192.168.1.1
DNS Server	0.0.0.0

IPv6 configuration

○ Automatic	○ Static
IPV6 Address	
Link local Address	FE80::200:CFF:FE03:E39
Default gateway	
DNS Server	

Page No. :

Configure Smartphone 0

Physical Config Desktop Programming Attributes

IP Configuration

ODHCP	OStatic
IPV4 Address	192.168.1.5
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1
DNS Server	0.0.0.0

IPV6 Configuration

OAutomatic	OStatic
IPV6 Address	
Link local Address	FE80:2E0:F9FF:FE12:4387
Default gateway	
DNS Server	

Configure laptop 0

Physical Config Desktop Programming Attributes

IP configuration

ODHCP	OStatic
IPV4 Address	192.168.1.5
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1
DNS Server	0.0.0.0

IPV6 configuration

OAutomatic	OStatic
IPV6 Address	
Link local Address	FE80:20A:F3FF:FE79:7E8B
Default gateway	
DNS Server	

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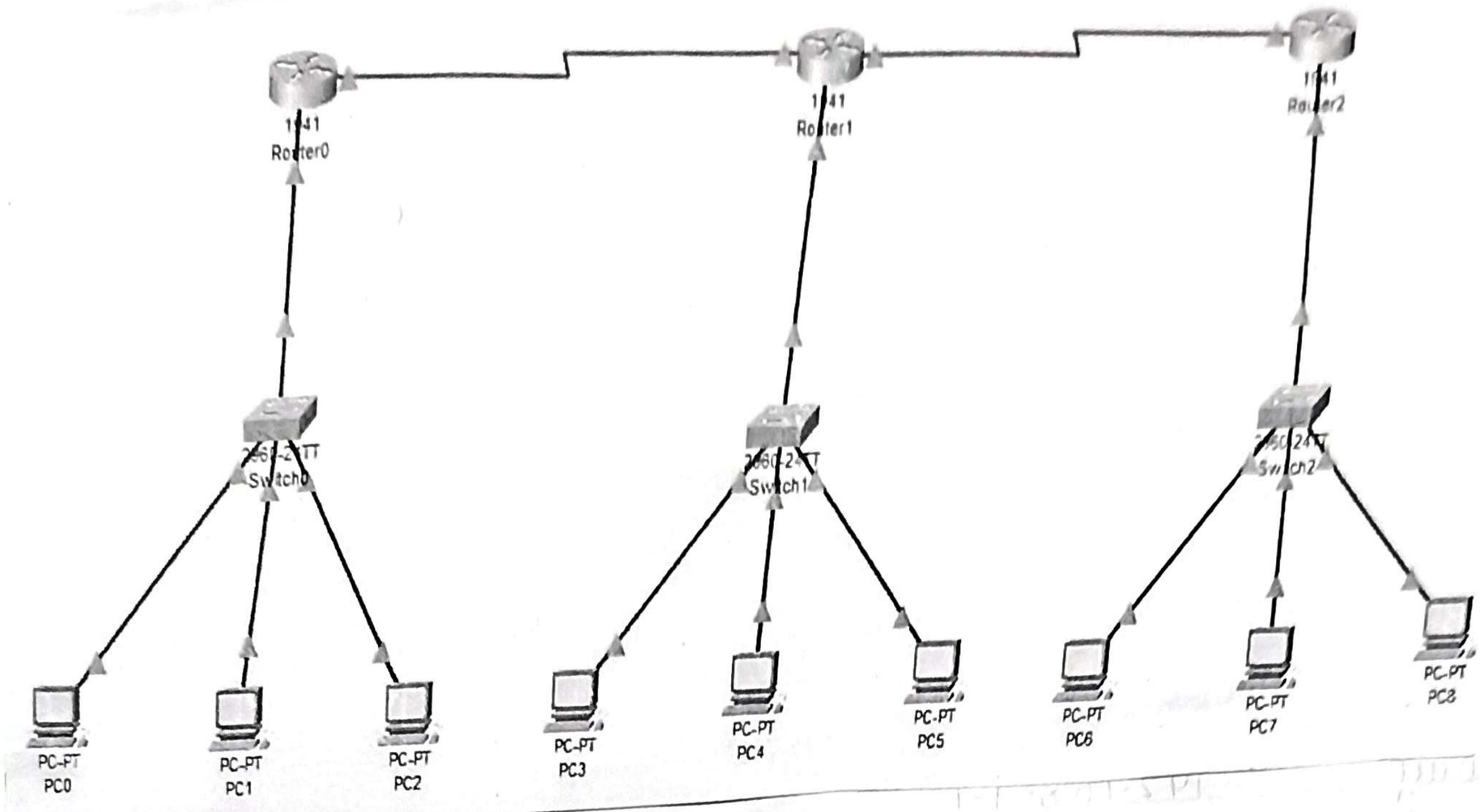
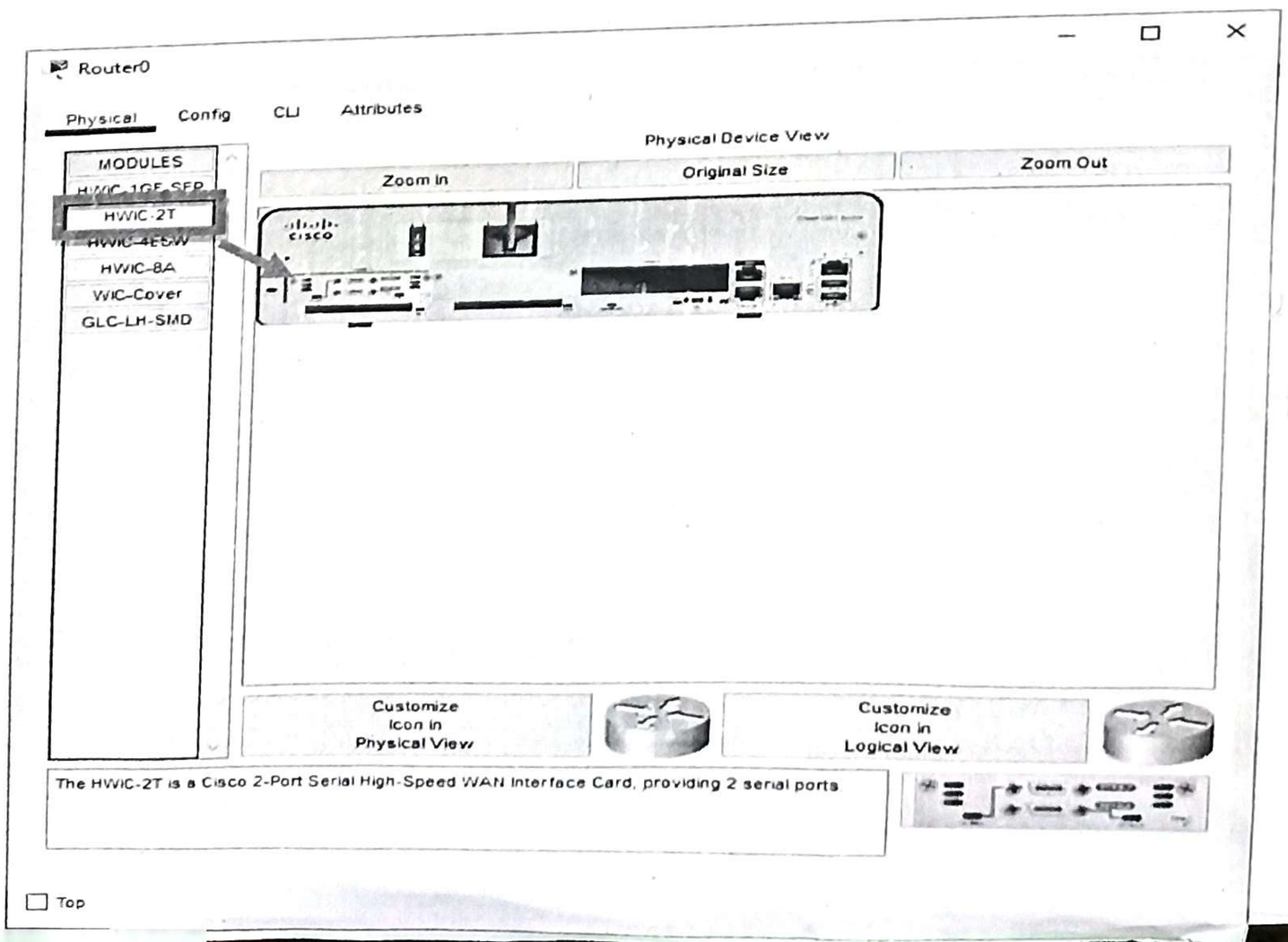


Host	Interface	IP address	Network Address	Default Gateway
Router 0	G0/0	10.0.0.1	10.0.0.0	
	S0/1/0	192.168.0.1	192.168.0.0	
Router 1	G0/0	20.0.0.1	20.0.0.0	
	S0/1/0	192.168.0.2	192.168.0.0	
	S0/1/1	192.168.1.1	192.168.1.0	
Router 2	G0/0	30.0.0.1	30.0.0.0	
	S0/1/1	192.168.1.2	192.168.1.0	
PC0	FastEthernet0	10.0.0.2	10.0.0.0	10.0.0.1
PC1	FastEthernet0	10.0.0.3	10.0.0.0	10.0.0.1
PC2	FastEthernet0	10.0.0.4	10.0.0.0	10.0.0.1
PC3	FastEthernet0	20.0.0.2	20.0.0.0	20.0.0.1
PC4	FastEthernet0	20.0.0.3	20.0.0.0	20.0.0.1
PC5	FastEthernet0	20.0.0.4	20.0.0.0	20.0.0.1
PC6	FastEthernet0	30.0.0.2	30.0.0.0	30.0.0.1
PC7	FastEthernet0	30.0.0.3	30.0.0.0	30.0.0.1
PC8	FastEthernet0	30.0.0.4	30.0.0.0	30.0.0.1

Adding Serial Interface in each Router



CLASS : SYCS DATE : 01/02/2023

Practical No. : 05 Topic :

Aim:- Using Packet Tracer to create a network with three routers with RIPV1 and each router associated network will have minimum three PC and show the connectivity

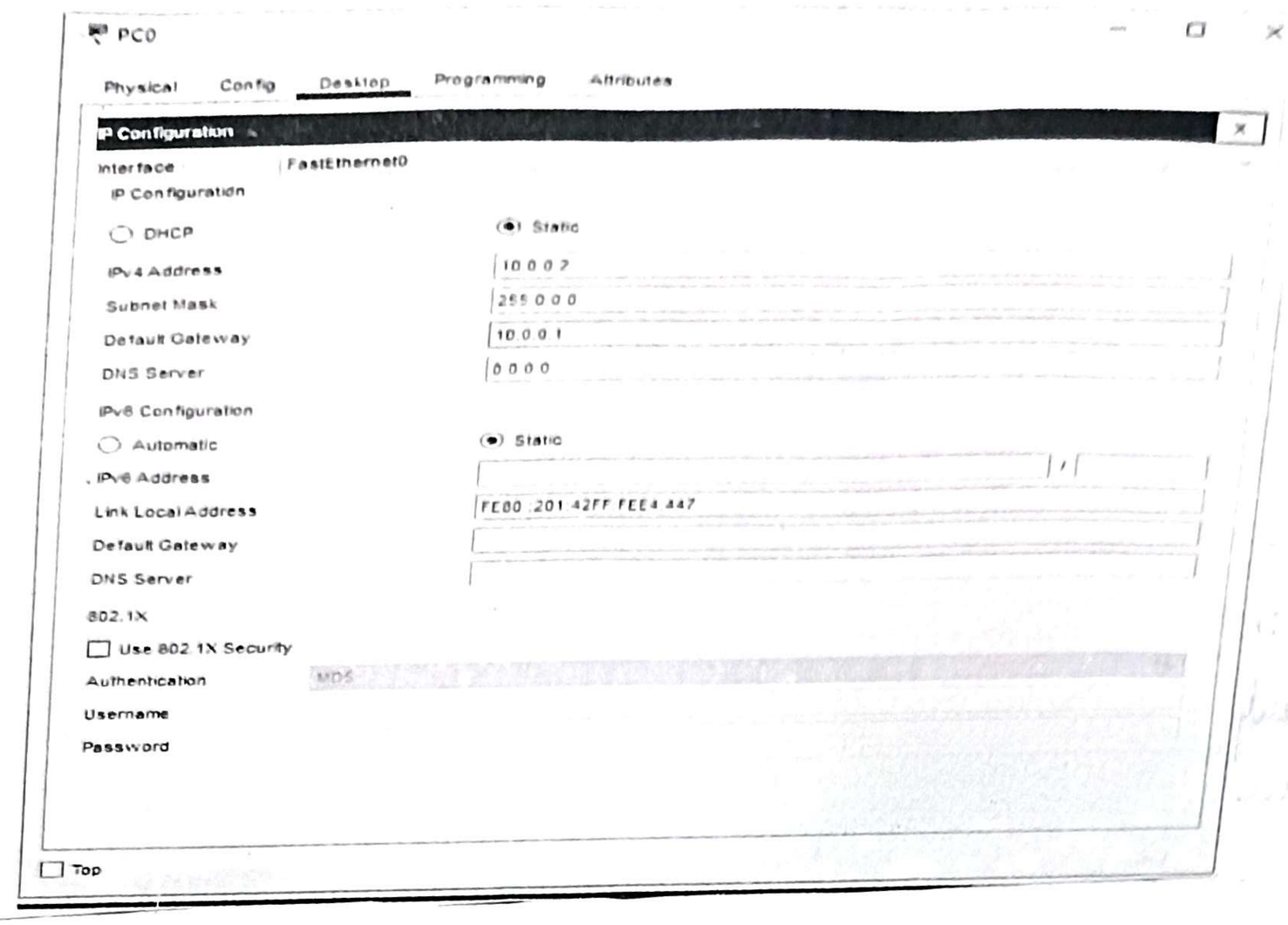
Theory:- RIP is one of the dynamic routing protocols and the first distance vector routing protcol that uses the hop count as routing metric. A lower hop count is preferred.
(2) Each router between the source and destination network is counted as one loop. RIP prevents routing loops by imposing a maximum number of hops on the path between source and destination.
In RIP, Every 30 seconds each router broadcasts is entire routing table to its nearest neighbors.

Pros and Cons of RIP protocol:-

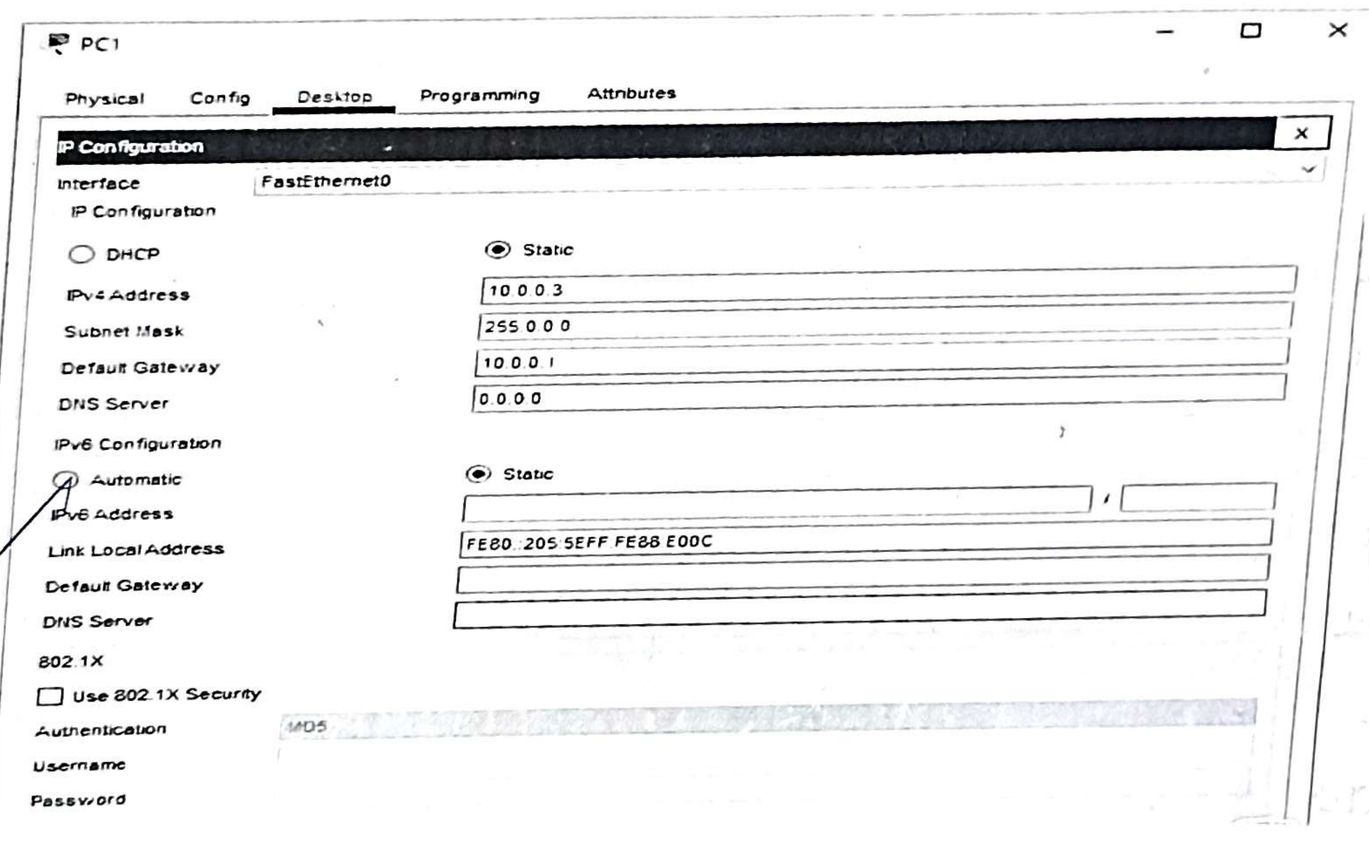
Pros:-
1. The RIP protocol is ideal for small networks since it is simple to learn and configure.
2. RIP routing is guranteed to work with nearly all routers.
3. When the network topology changes, RIP does not require an update.

Cons:-
1. RIP does not support variable length Subnet masks.
2. RIP transmit updates every 30 seconds which cause traffic and consumes bandwidth.

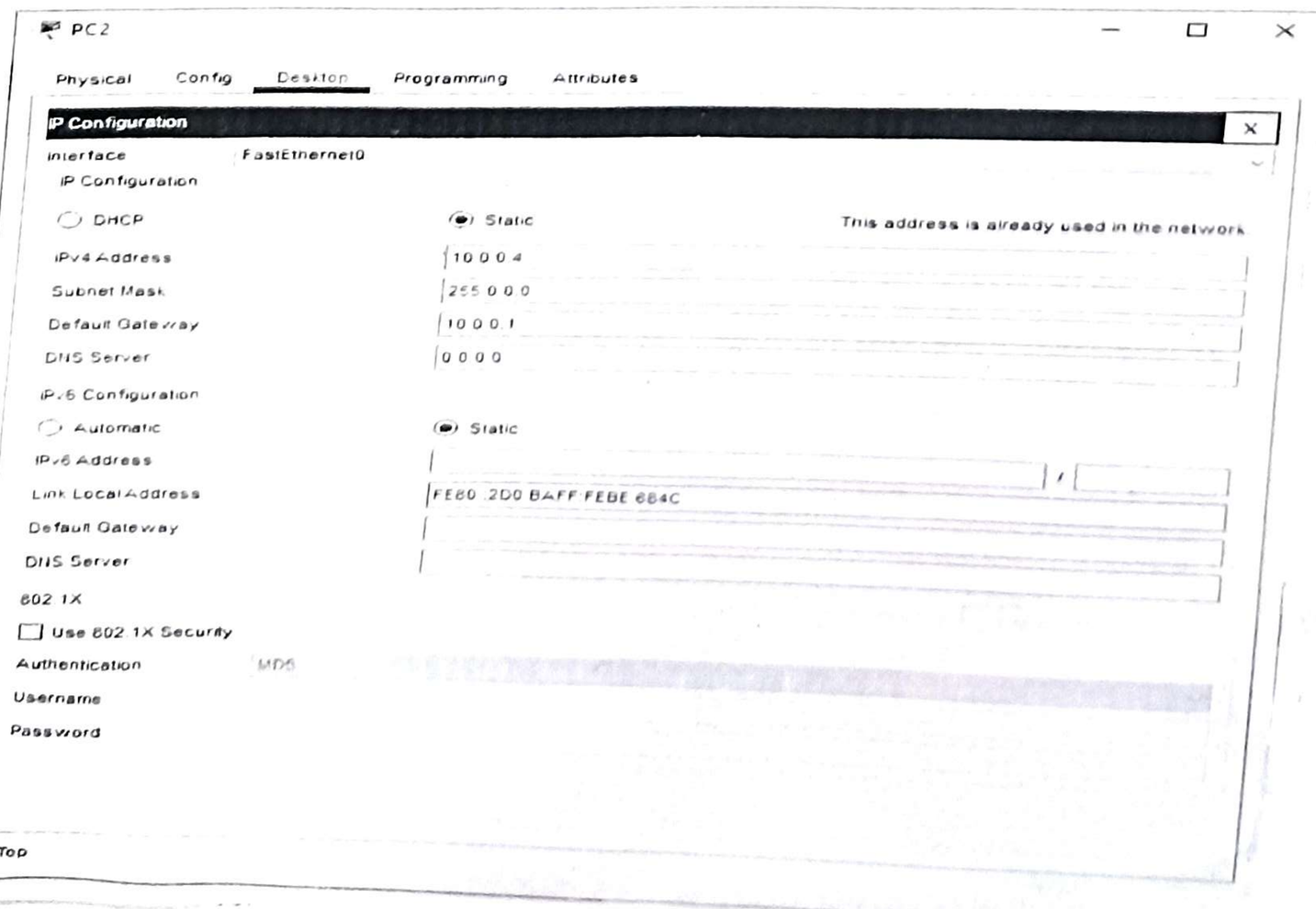
Configuring PC0:



Configuring PC1:



Configuring PC2:



3. RIP hop counts are restricted to 15, hence any router beyond the distance is deemed infinity and becomes unreachable.
4. The rate of convergence is slow in RIP compared to other routing protocols. When a link fails finding alternate network paths take a long time.
5. RIP does not support multiple path on the same time, route which may result in extra routing loops.

Configuring Router 0 (using the CLI mode)

Router>en

Router>enable

Router#

Router# configure terminal

Enter configuration command, one per line: End with CNTL/Z.

Router(config)# interface gigabit Ethernet 0/0

Router(config-if)# ip address 10.0.0.1 255.0.0.0

Router(config-if)# no shutdown

Router(config-if)# exit

Router(config)# interface serial 0/1/0

Router(config-if)# ip address 192.168.0.1 255.255.255.0

Router(config-if)# no shutdown

Router(config-if)# exit

Router(config)#

Router#

Configuring Router 1 (using the CLI mode)

Router>enable

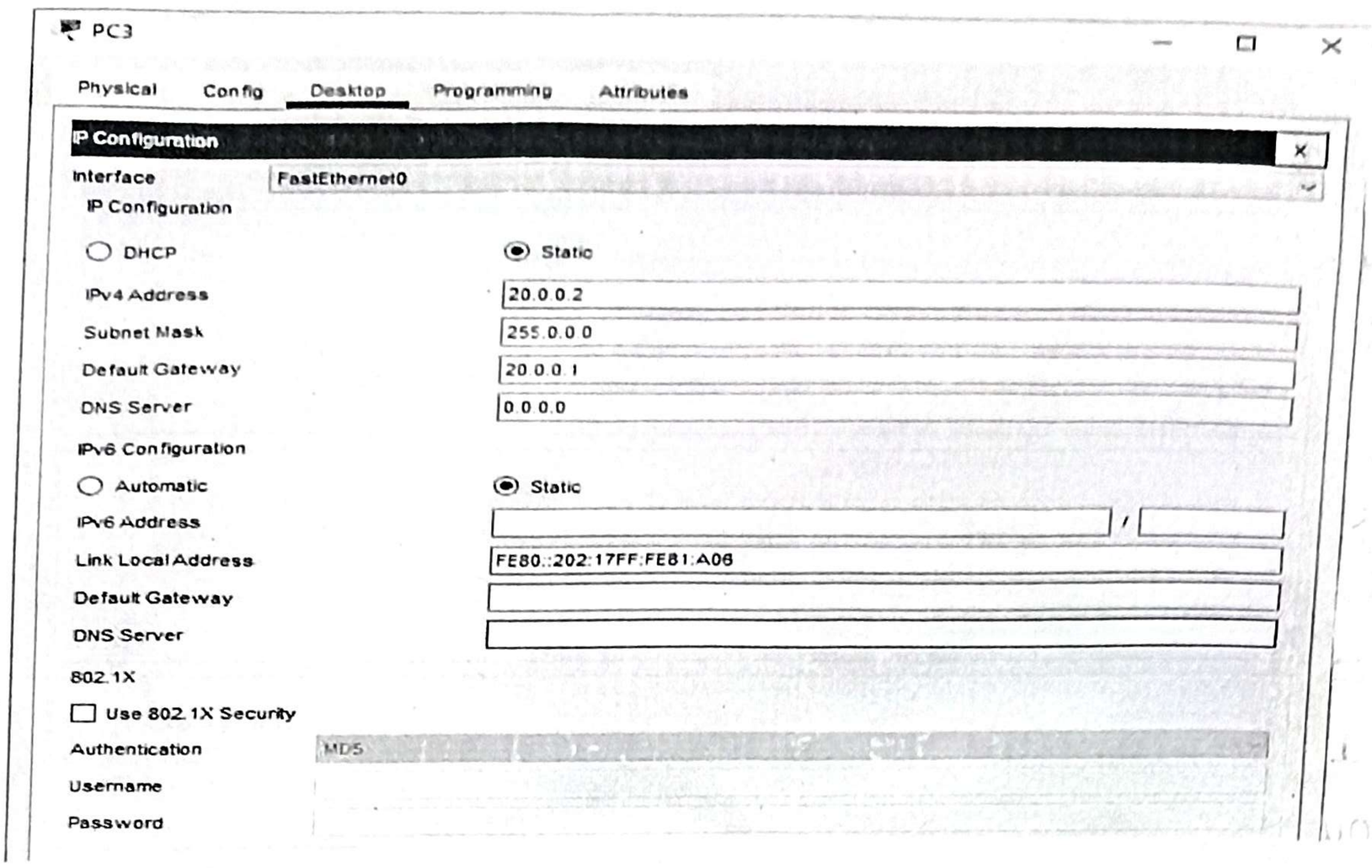
Router# configure terminal

Router(config)# interface gigabit Ethernet 0/0

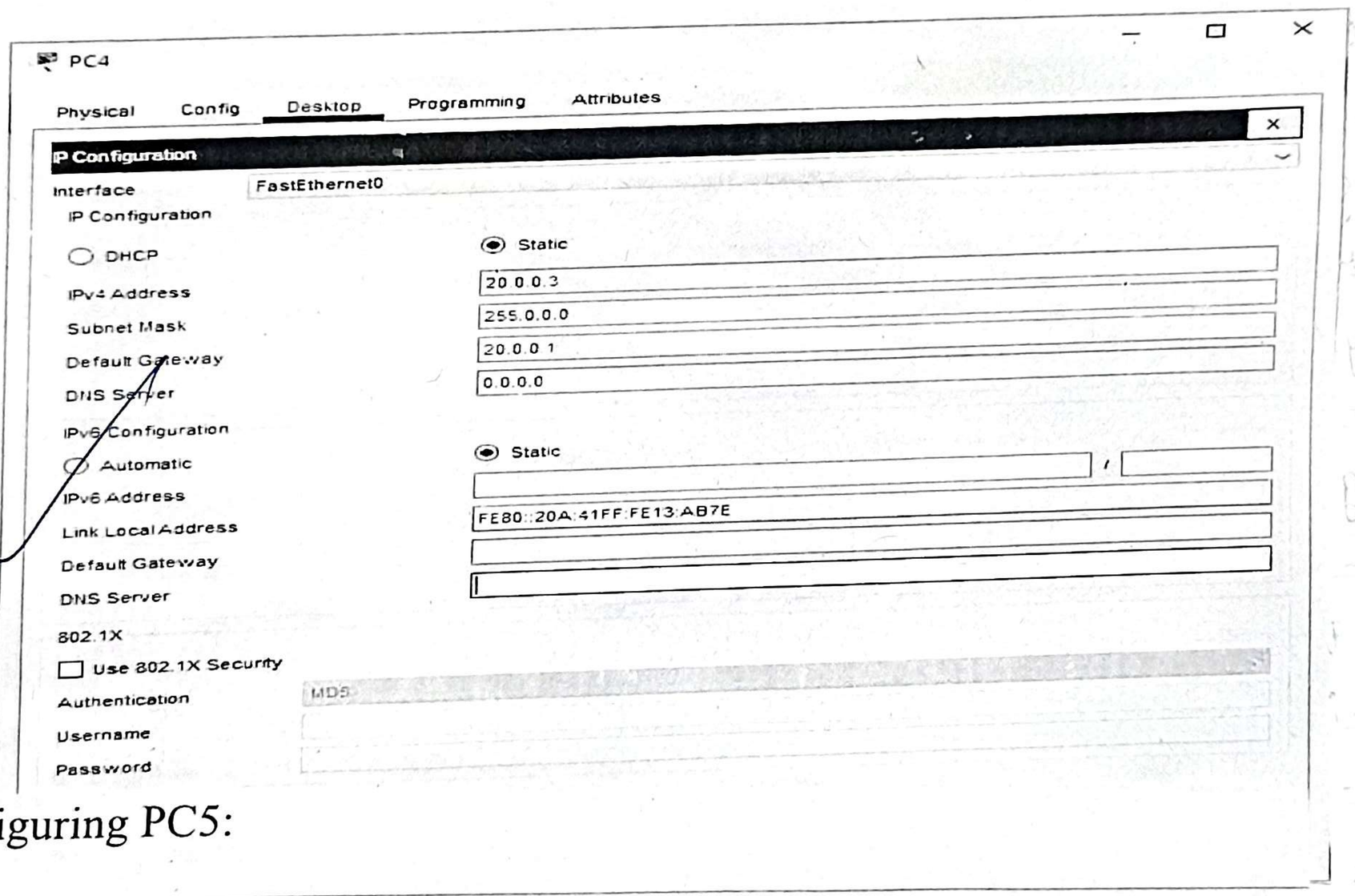
Router(config-if)# ip address 20.0.0.1 255.0.0.0

Router(config-if)# no shutdown

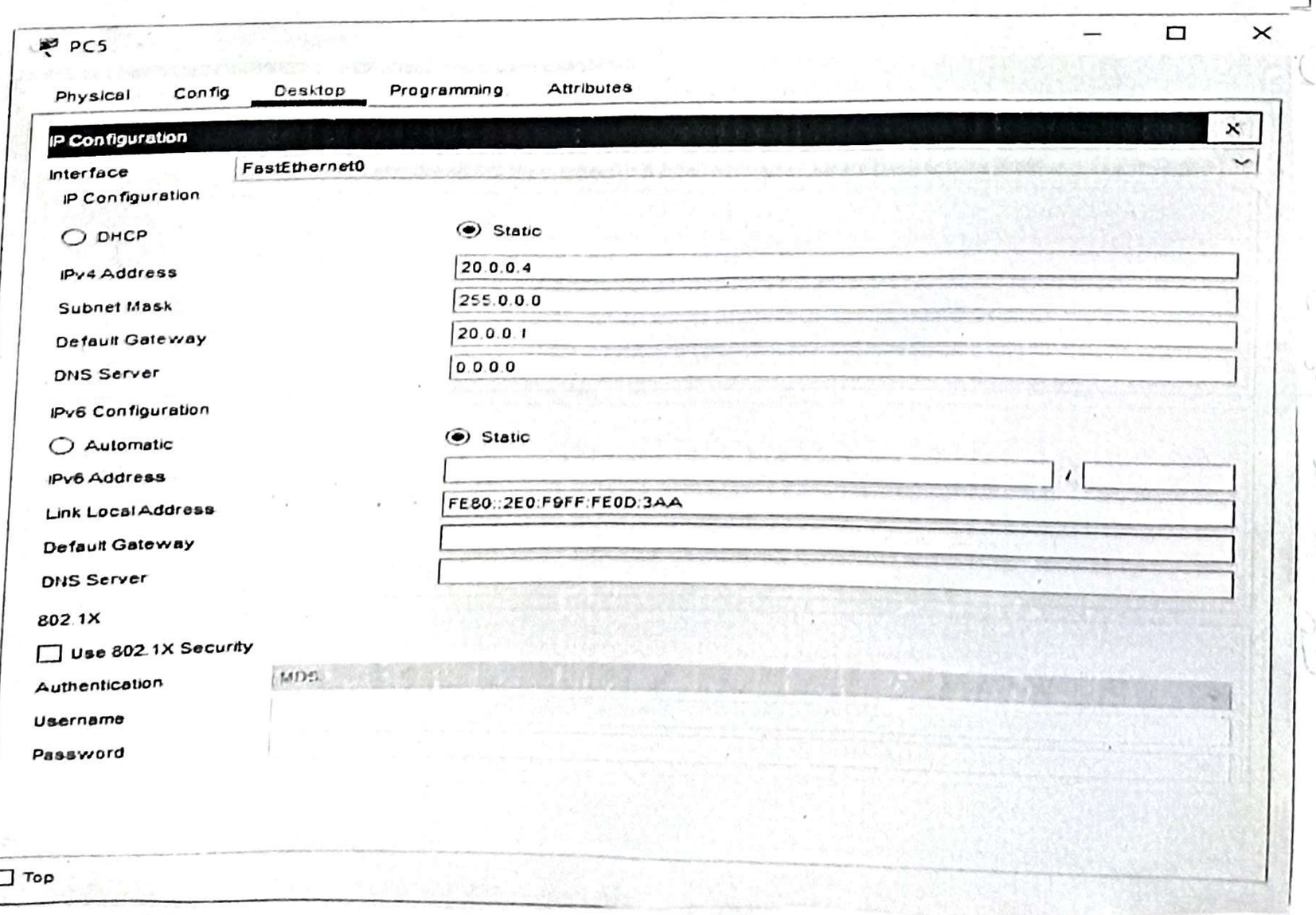
Configuring PC3:



Configuring PC4:



Configuring PC5:



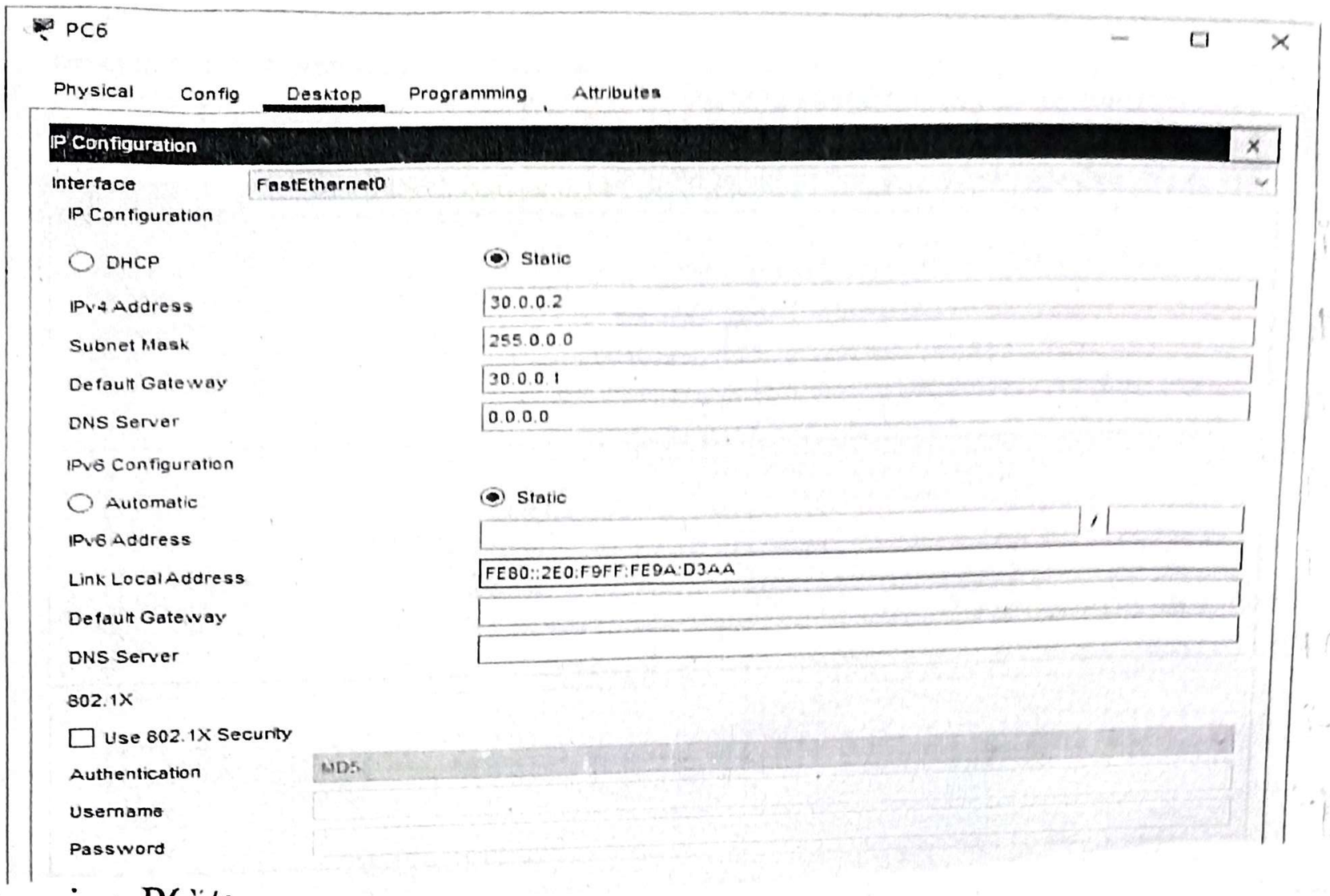
Router(config-if)# exit
Router(config)# interface serial 0/1/0
Router (config-if)# ip address 192.168.0.2 255.255.255.0
Router(config-if)# no shutdown
Router(config-if)# exit
Router(config)# interface serial 0/1/1
Router(config-if)# ip address 192.168.0.2 255.255.255.0
Router (config-if)# no shutdown

Configuring Router 2 (using the CLI mode)
Router>enable
Router# configure terminal
Router(config)# interface gigabitEthernet 0/0
Router (config-if)# ip address 30.0.0.1 255.0.0.0
Router (config-if)# no shutdown
Router (config-if)# exit

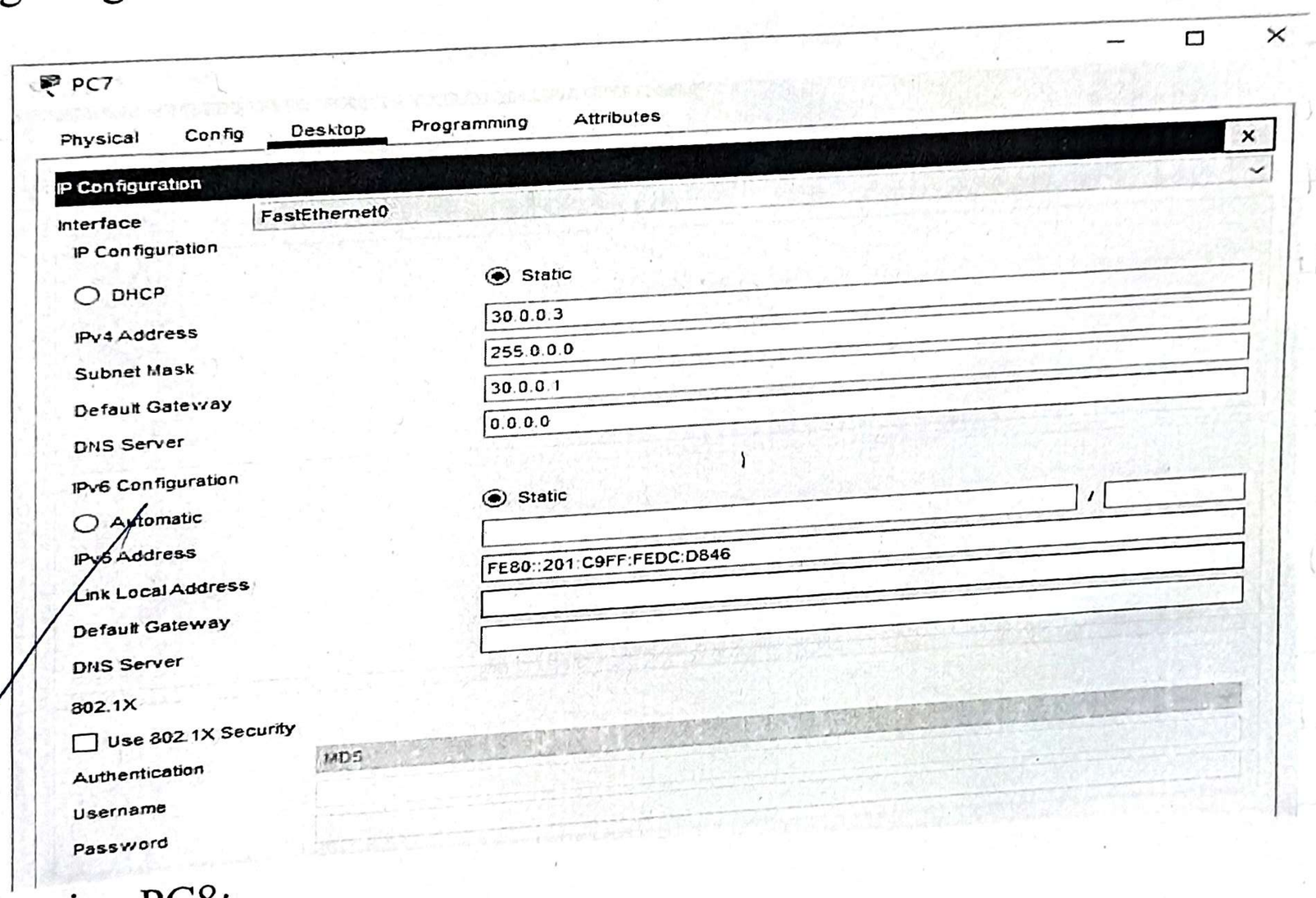
Router (config)# interface Serial 0/1/1
Router (config-if)# ip address 192.168.1.2 255.255.255.0
Router(config-if)# no shutdown

Setting the RIP V1 on Router 0
Router>enable
Router# configure terminal
Router(config)# router rip
Router(config-router)# network 10.0.0.0
Router(config-router)# network 192.168.0.0
Router(config-router)# exit

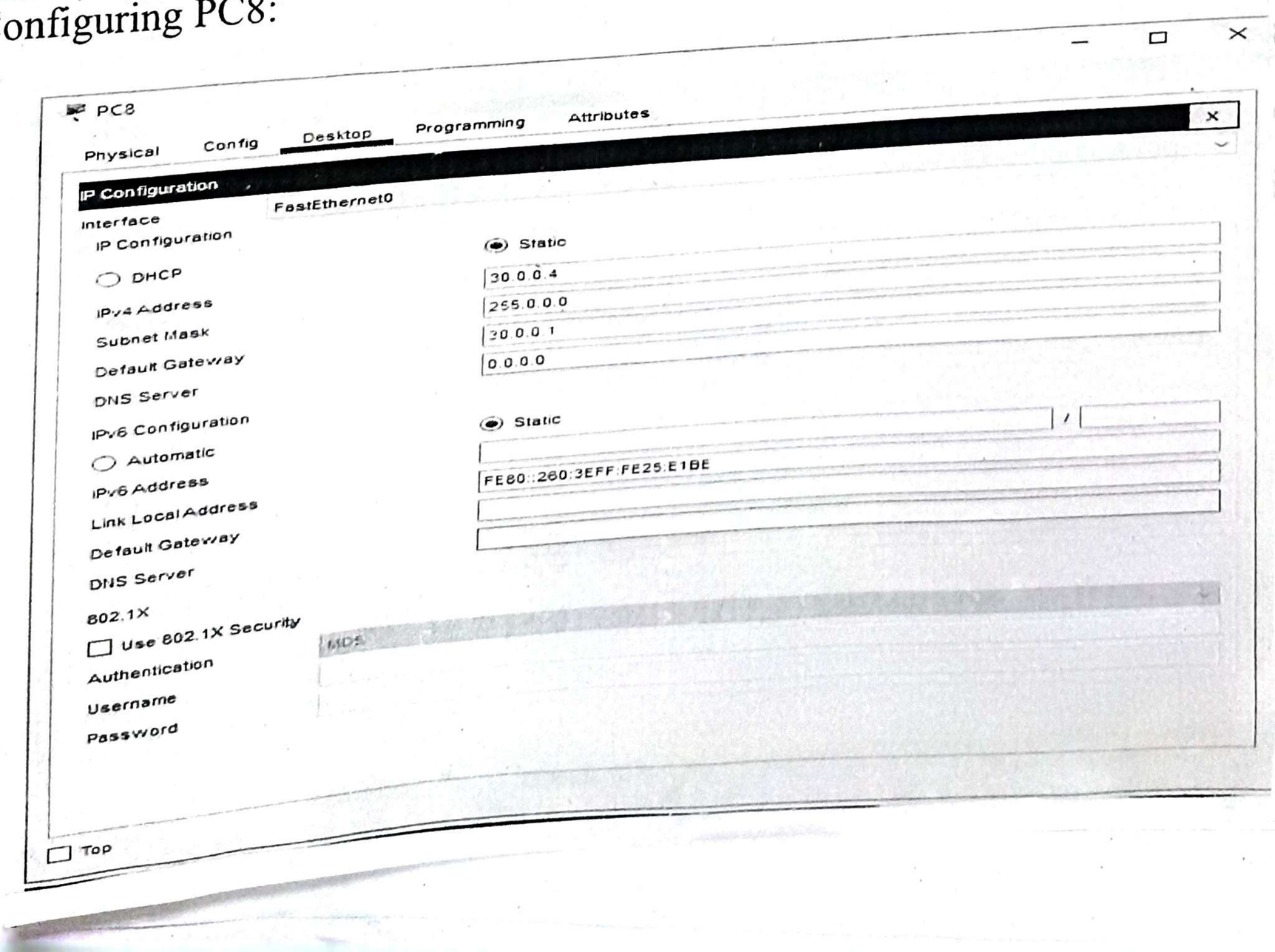
Configuring PC6:



Configuring PC7:



Configuring PC8:



Page No. :

Setting the RIPv1 on Router 1

Router > enable

Router # configure terminal

Enter configuration commands, one per line. End with CNTL/Z

Router (config) # router rip

Router (config-router) # networks 192.168.0.0

Router (config-router) # network 20.0.0.0

Router (config-router) # network 192.168.1.0

Router (config-router) # exit

Router (config) #

Router #

Setting the RIPv1 on Router 2

Router > enable

Router # configure terminal

Router (config) # router rip

Router (config-router) # network 192.168.1.0

Router (config-router) # network 30.0.0.0

Router (config-router) # exit

Router (config) #

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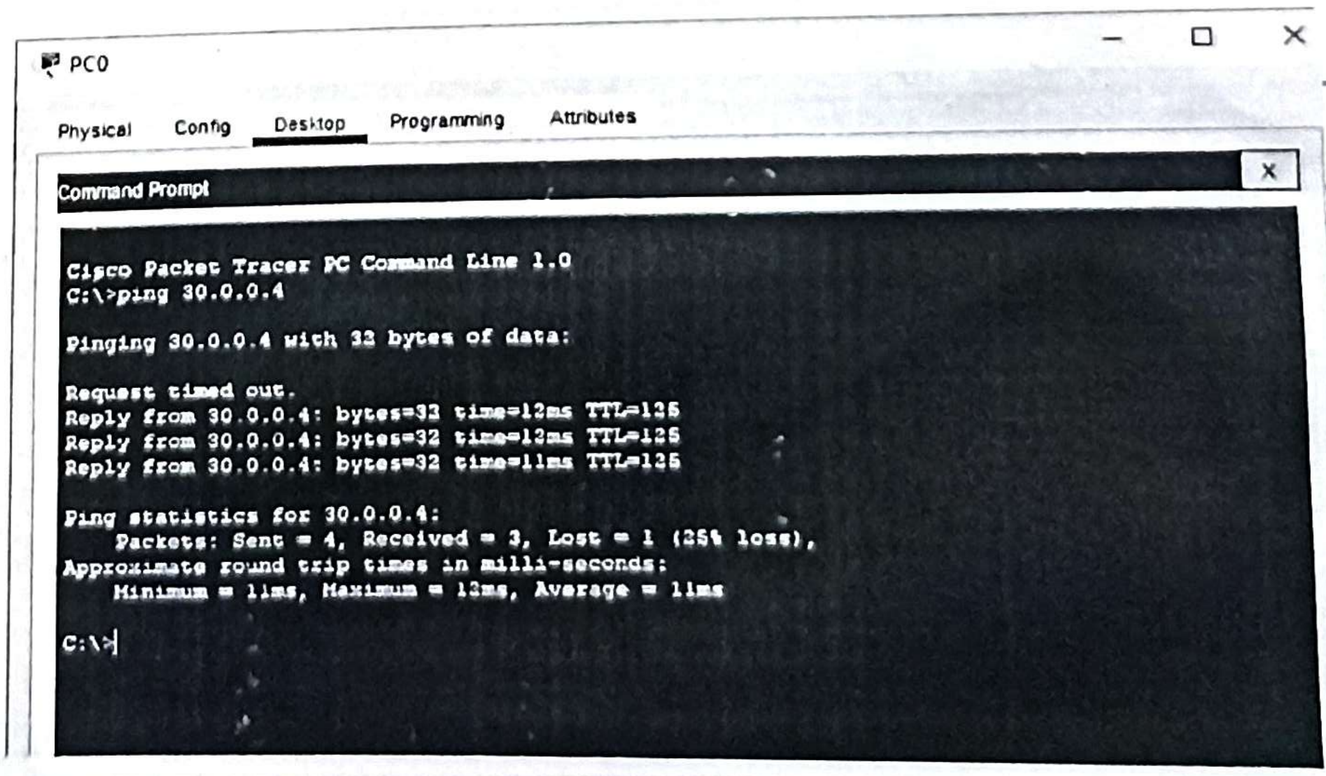
Checking the connectivity by using the ping command

Pinging PC8 (ip address 30.0.0.4) from PC0



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CLASS : SYCS | DATE : 02/02/2023

Practical No. : 06 Topic :

Aim :- Using Packet Tracer to create a network with three routers with RIPV2 and each router associated network will have minimum three PC and show the connectivity.

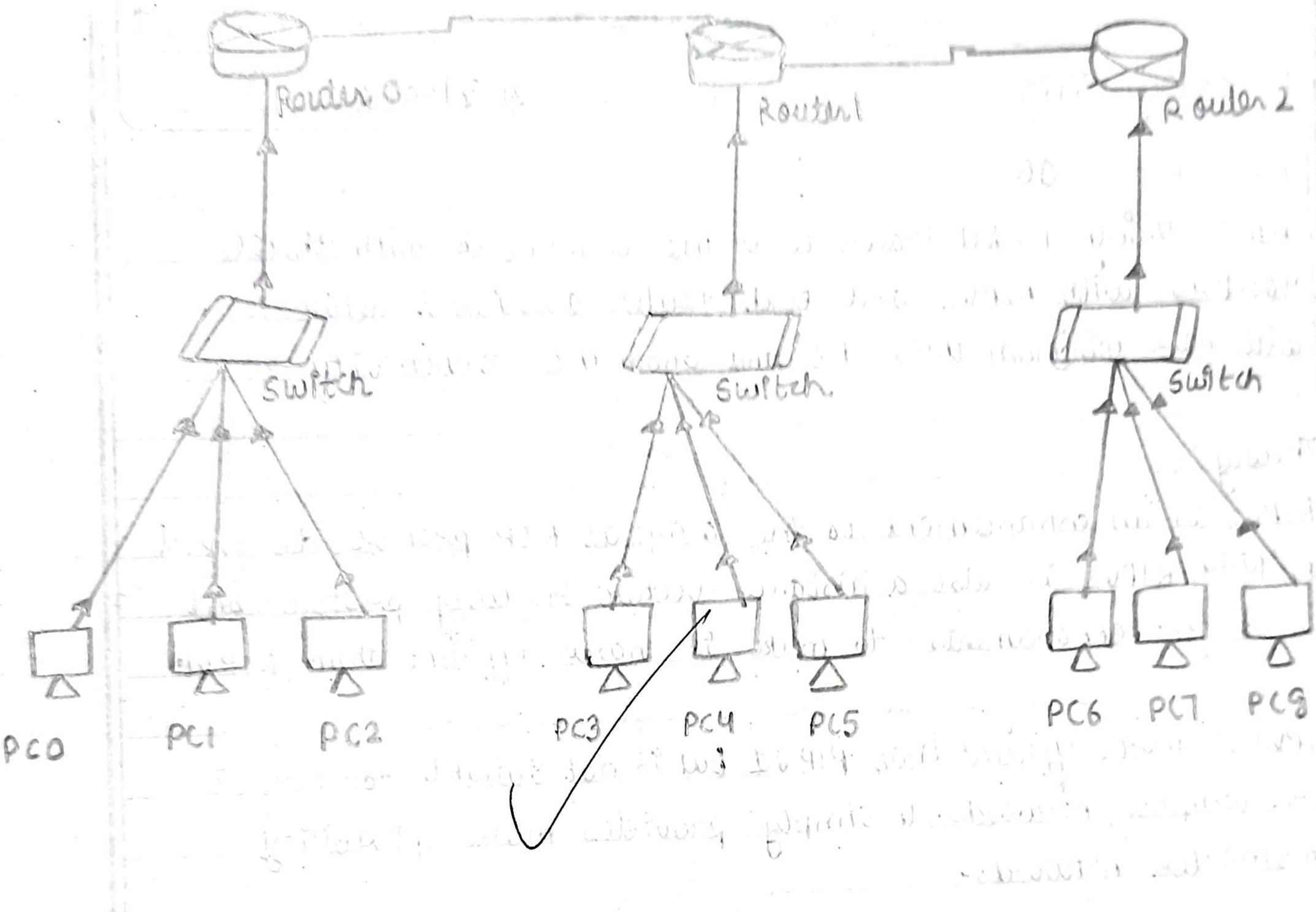
Theory :-

RIPV2 is an enhancement to the original RIP protcol developed in 1994, RIPV2 is also a distance vector routing protocol but has a few enhancements to make it more effiient than RIPV1.

- RIPV2 is more effiient than RIPV1 but is not suitable for larger more complex networks. It simply provides more flexibility on smaller networks.

RIPV2 uses the same routing metric as RIPV1 the hop count. Updates with RIPV2 are sent via multicasts and not broadcast. RIPV2 can also be configured to do classless routing. When configured for class routing. RIPV2 will transmit submit mask when it sends routing updates. This allows for the use of subnetting and discontiguous works and networks.

RIPV2 allows for authentication to be required for updates. When authentication is enabled each router is configured with the RIP update password. The password sent with the RIP update must match the password configured on the destination router. If the password does not match, then the receiving router will not proces the update.


Router 0
Router1
Router 2
Switch
Switch
Switch
PC0
PC1
PC2
PC3
PC4
PC5
PC6
PC7
PC8

Advantages of RIPv2

- It's a standardized protocol
- It's VLSM complaint
- Provides fast convergence
- It sends triggered updates when the network changes
- Works with snapshot routing - making it ideal for dial networks.

Disadvantage of RIPv2

- Max hop count of 15, due to the 'count-to infinity' vulenerability
- No concept of neighbors
- Exchange entire table with all neighbors every 30 second (except in the case of triggered update).

Configuring Router 0 for RIPv2 (using the CLI mode)

Router > enable

Router # configure terminal

Router (config) # router rip

Router (config-router) # version 2

Router (config-router) # network 10.10.0.0

Router (config-router) # network 192.168.0.0

Router (config-router) # exit

Router (config) #

Configuring Router 1 for RIPv2 (using the CLI mode)

Router > enable

Router # configure terminal

Router (config) # router rip

Router (config-router) # version 2

Router (config-router) # network 10.20.0.0
Router (config-router) # network 192.168.0.0
Router (config-router) # network 192.168.1.0
Router (config-router) # exit
Router (config) #

Configuring Router 2 for RIP V2 (using the CLI mode)
Router> enable
Router # configure terminal
Router (config) # router rip
Router (config-router) # version 2
Router (config-router) # network 10.30.0.0
Router (config-router) # network 192.168.1.0
Router (config-router) # exit
Router (config) #

Rajesh
2/4/15

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RISE WITH EDUCATION

CLASS : SYCS | DATE : 06/02/2023

Practical No. : 07 Topic :

Aim :- Using Packet Tracer create a network with three routers with OSPF and each router associated will have minimum three PC and show connectivity.

Theory :-

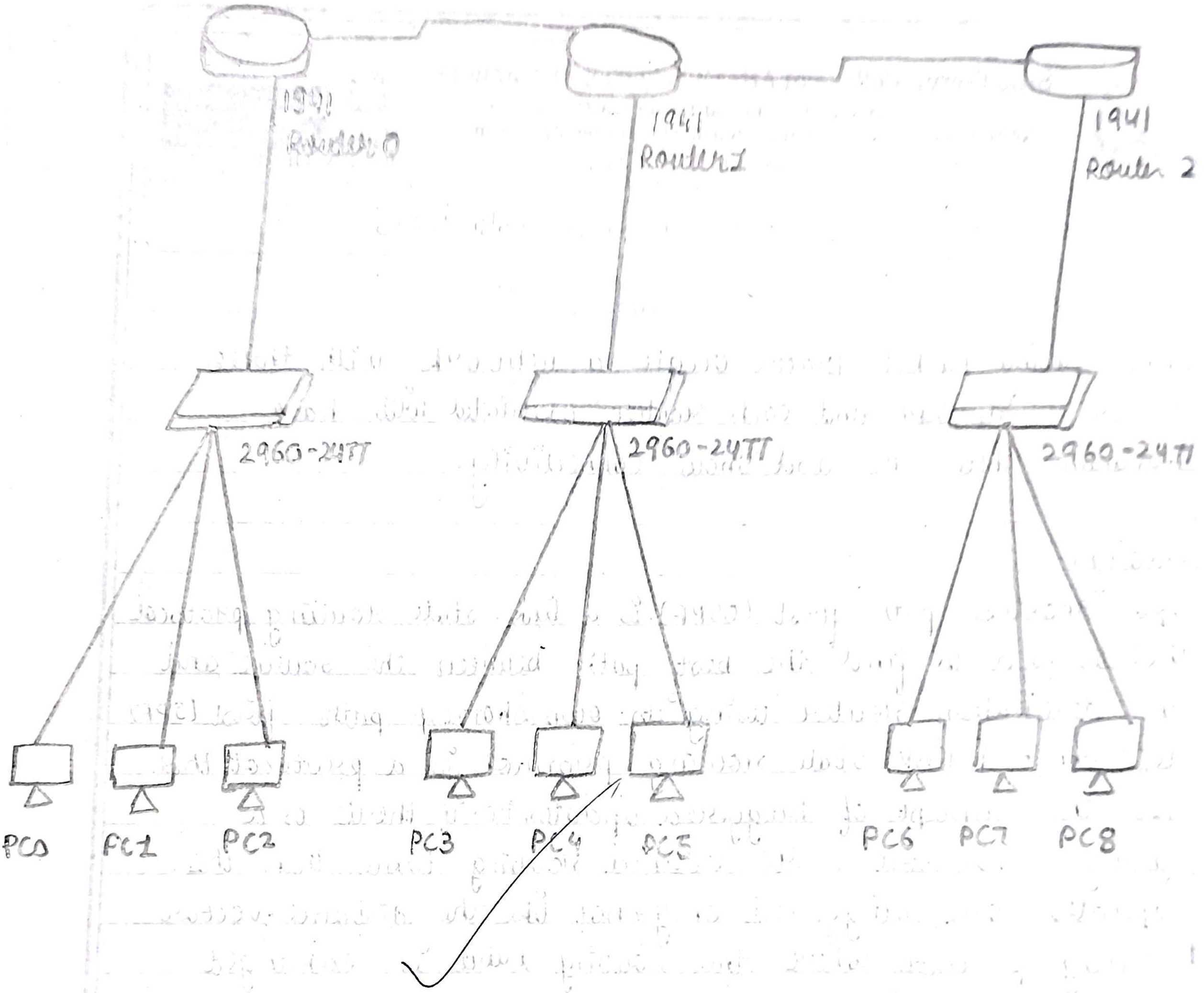
Open shortest path first (OSPF) is a link state routing protocol that is used to find the best path between the source and the destination router using its own shortest path first (SPF) algorithm. A link state routing protocol is a protocol that uses the concept of triggered updates, i.e. if there is a change observed in the learned routing table then the updates are triggered only, not like the distance-vector routing protocol where the routing table is exchanged at a period of time.

Open Shortest path first (OSPF) is developed by Internet Engineering Task force (IETF) as one of the Interior Gateway Protocol (IGP) i.e the protocol which aims at moving the packet within a large autonomous system or routing domain.

OSPF advantages :-

1. Both IPV4 and IPV6 routed protocols
2. Load balancing with equal cost routes for the same destination
3. Unlimited hop counts
4. Trigger updates for fast convergence

Page No.


1941
Router 0
1941
Router 1
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Router 2
2960-24TT
2960-24TT
2960-24TT
PC0
PC1
PC2
PC3
PC4
PC5
PC6
PC7
PC8

Page No. :

5. A loop-free topology using SPF algorithm
6. Run-on most routers
7. Classless protocol

There are some disadvantages of OSPF like It requires an extra CPU process to run the SPF algorithm requiring more RAM to store adjacency topology and being more complex to set up and hard to troubleshoot.

Rejesh
24/2/25

CLASS : SYCS DATE : 24/02/2023

Practical No. : 08 Topic :

Aim:- Using Packet Tracer, create a network with three routers with BGP and each router associated network will have minimum three PC and show connectivity.

Theory:-

Border Gateway Protocol (BGP) is used to Exchange routing information for the Internet and is the protocol used between ISP which are different Autonomous System (AS) The protocol can connect together any internetwork of autonomous system using an arbitary topology. The only requirement is that AS have at least one router that is able to run BGP and that is router connect to at least one other AS's BGP router.
BGP's main function is to exchange network reachability information with other BGP system.

Characteristics of Border Gateway Protocol (BGP)

1. The main role of BGP is to provide communication between two autonomous system.
2. BGP supports Next-Hop Paradigm.
3. Co-ordination among multiple BGP speaker within the AS (Autonomous System)
4. BGP advertisement also include path information, along with the reachable destination and next destination pair.

Page No. :

5. BGP can implement policies that can be configured by the administrator.
6. BGP runs over TCP.
7. BGP conserve network Bandwidth.
8. BGP supports CIDR.
9. BGP also supports Security.

rajeshri
24/12/25